Reimagining Auckland's suburbs: Exploring how Auckland’s urban design was informed by past transport technologies, and how it can be shaped by future transport systems.

Malachy Lynch

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Abstract:

Auckland presents a unique urban context shaped by its rapid post-war shift toward low-density, car-dependent development, which has influenced the city's suburban form and travel behaviour. New Zealand has one of the highest rates of per-capita car ownership in the world, with approximately 869 vehicles per 1,000 people, reflecting a deep reliance on private automobiles. In Auckland, 58 percent of all car trips are under 5 km, and 30 percent are under 2 km, indicating that many journeys could reasonably be made by walking, cycling, or public transport. This dependency has contributed to sprawling suburbs, long commutes, restricted access to amenities, and ongoing sustainability challenges.

This thesis examines the historical evolution of Auckland's transport systems and urban form, from pre-colonial movement patterns and early rail-based settlement through post-war suburban expansion, to understand how planning decisions entrenched car dependency. It then analyses contemporary and emerging transport modes, focusing on realistic, established technologies that can support a shift toward more sustainable and connected neighbourhoods.

Building on these insights, the design component of the thesis proposes a staged intervention framework that transitions from temporary, low-cost street improvements to permanent built outcomes. These interventions demonstrate how suburban streets can be reimagined as people-focused, ecologically supportive, and locally productive spaces. Using Balmoral as a case study, the project shows how tactical urbanism, community-led activation, and incremental infrastructure upgrades can collectively reduce reliance on private vehicles while enhancing social, ecological, and mobility outcomes.

Together, the research and design illustrate a pathway for evolving Auckland's suburban environments into more connected, resilient, and people-centred places.

IMAGE REMOVED FOR COPYRIGHT

Figure 1: Auckland electric tramway system circa 1956 –
SOURCE: Auckland Electric Tramways Company Limited

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"*I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor used artificial intelligence tools or generative artificial intelligence tools (unless it is clearly stated, and referenced, along with the purpose of use), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.*"

Introduction

This research investigates the evolving relationship between transport systems and urban design, asking the core question: How has Auckland's urban form been shaped by past transport technologies, and how can it be reshaped by future mobility systems? The project focuses on Tāmaki Makaurau Auckland, a young and rapidly changing city whose built environment has been strongly influenced by a series of transport transitions, from early rail and tram networks to post war motorway expansion and the recent reinvestment in public transport infrastructure and services.

Auckland's extensive suburban footprint, combined with its ecological sensitivity and cultural context, makes it an important case study for exploring how transport systems can be reimagined not only as a means of movement but also as drivers of urban regeneration, social wellbeing, and ecological restoration. As the city enters a period of significant transport transformation, with the opening of the City Rail Link in 2026, and continued investment in rapid transit corridors, understanding these relationships becomes increasingly critical.

This thesis investigates three key areas:

- The historical influence of transport technologies on Auckland's settlement patterns, urban morphology, and growth.
- The opportunities and constraints embedded within existing and proposed transport corridors, and the modes that use them.
- Contemporary models such as transit-oriented development (TOD), green oriented development (GOD), and tactical urbanism, and how these can inform more equitable, connected neighbourhoods.

Together, these themes establish a framework for assessing a selected site in the suburb of Balmoral and developing a design-led response to future mobility scenarios. The project explores how design strategies can support communities in transitioning towards active and public transport in ways that are accessible, visible, and locally meaningful. It considers how change can occur incrementally, beginning with temporary interventions and evolving into long term solutions that respond to community needs, through feedback, and behaviour over time.

Through this approach, the research positions transport as a key spatial structure that can help shape healthier, more connected, and more resilient neighbourhoods across Auckland.

Figure 2: View from the SkyTower looking South across the Isthmus

Part One: Transport and Urban Form:

1. Research Methodology

This research question is investigated via a practice-based research methodology, combining theoretical investigation with design-led exploration to examine how Auckland's urban design was informed by past and potential future transport technologies. The project focuses on the redevelopment of a neighbourhood block in the suburb of Balmoral as a catalyst for regenerative urban transformation, and shift in travel behaviour. Exploring how transport and urban infrastructure can foster a more sustainable, connected, and resilient urban environment within the city.

The thesis is structured into two interrelated parts:

Part One: Through literature review, precedent analysis, and case studies.
This section investigates the historical trends and decisions of transport infrastructure in Auckland and the relationship it had on the built urban form, Transport Technologies and Development Potential, transit-oriented development (TOD) and the opportunity for more Green-oriented development (GOD).

Part Two: Translating the theoretical findings into a design response.
Through iterative design work, this section develops strategies for a regenerative transformation of a neighbourhood block in the suburb of Balmoral. The design process incorporates mapping, speculative drawing, and spatial modelling to explore how multimodal streets, ecological green corridors, and human-centred design can be integrated into the existing built environment, through temporary and long-term interventions.

This methodology connects academic research with architectural practice, using design as a tool for exploring and generating potential solutions.

By integrating transport planning theory, urban morphology, and regenerative design. The project develops a scalable and progressive framework, recognising that transport and urban form are interdependent, and that positive outcomes must be achieved in both to create a more connected, people-focused, and environmentally responsive neighbourhoods.

2. Auckland's Evolution Early Years:

This chapter examines how changing transport modes shaped Auckland's urban form from pre-colonisation to the mid-20th century. It traces the influence of walking, railways, and trams on settlement patterns and land use. These shifts reveal how the transport network of the time guided Auckland's growth and connectivity, before the post war shift.

Figure 3: Collage Early Years

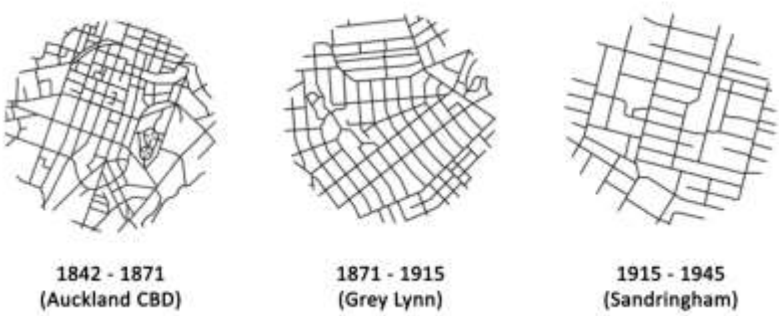

Figure 4: Early Years: Street Grids

2.1 Main Line Rail and Tram Era (1870–1950):

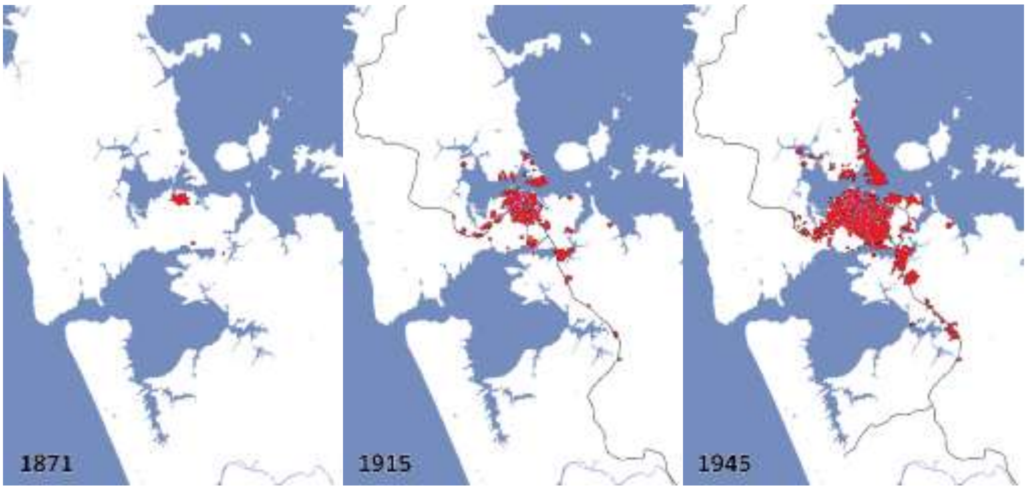

Figure 5: (left) Urban Growth 1871
Figure 6: (centre) Urban Growth 1915
Figure 7: (right) Urban Growth 1945

During the pre-colonial period from 1600 to 1750 "the Tāmaki tribes terraced the volcanic cones, building pā" *(McClure, 2009)* Surrounding these pā, extensive kūmara gardens covered more than 2,000 hectares of land and were transported, along with other resources, via foot or by waka.

"Māori used waka tete for coastal travel, and waka tīwai for river and lake travel. Travel by water was so much preferred that, where it was possible, waka was hauled overland between waterways." (Wright & Cook, 2010)

Figure 8: Māori Pa, sites of activity and Portages

Urban expansion began in 1840, when 3,000 acres of land were gifted to Governor Hobson by Ngāti Whātua leader Te Kawau *(Heart of the City Auckland, n.d.).*

In the early years of the city, *"Auckland could be considered a mature 'pedestrian city' where most journeys to work were of necessity on foot… Although houses had spread along routes across the isthmus, the limit of the compact urban area was still only two miles from the waterfront."* *Mexsom, K. (2021).*

With walking and sea travel as the primary modes of transport, Auckland developed as a series of small, walkable settlements clustered along the Waitematā and Manukau Harbours, particularly the city of Auckland in the north and Onehunga to the south. These coastal connections were essential for trade, communication, and movement between communities. Smaller villages, such as Panmure along the Tāmaki River, also emerged, linked by waterways that served as the main transport corridors of the time.

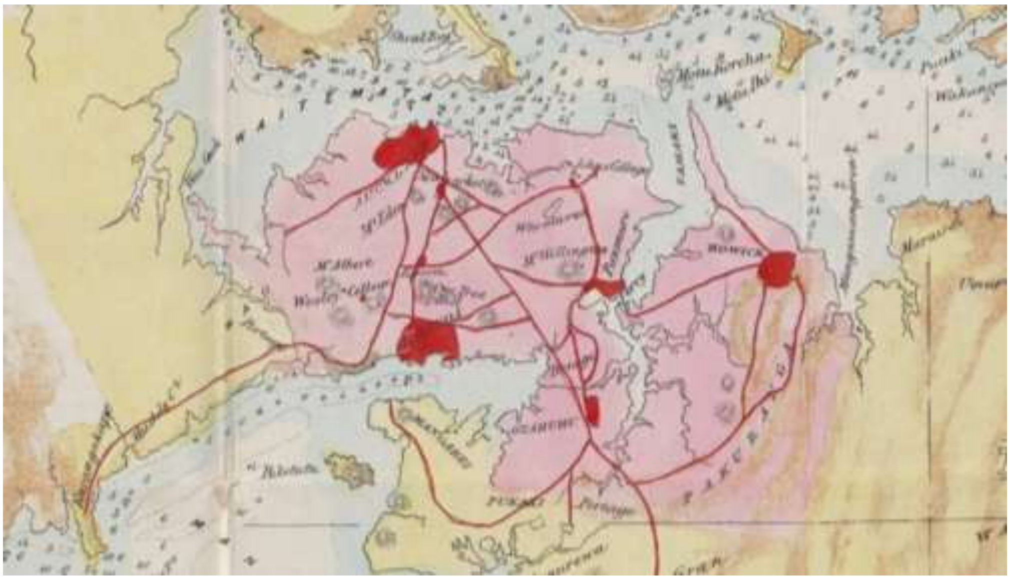

Figure 9: Map of the Auckland district, 1852
SOURCE: Auckland Libraries Heritage Collections Map 1326

Main Line Rail

The railways first connected Auckland to surrounding areas such as Onehunga on 24 December 1873 and expanded significantly over the following decade. These connections *"encouraged population growth in places like Henderson, Otahuhu and Papakura long before they became part of Urban Auckland."* *Mexsom, K. (2021).*

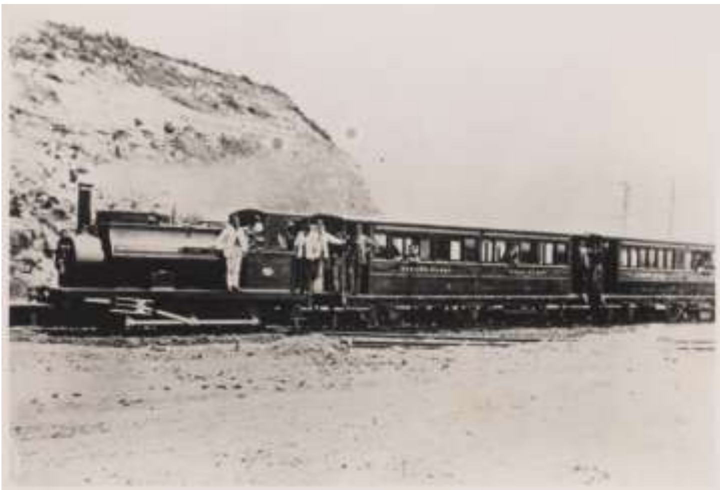

Figure 10: First passenger train on the Onehunga line, 24 December 1873
SOURCE: Auckland Libraries Heritage Collections 957-139-1

The Auckland to Mercer rail line opened on 20 May 1875, linking the city with the North Waikato. The North Auckland Line followed on 21 December 1880, extending services to Henderson. *"Steam trains couldn't stop*

very frequently, because of their slow acceleration... But once in motion, they could move passengers at an unprecedented rate: 10 miles or more in a half-hour. *(English, 2019, para. 13)*
These rail lines enabled early suburban expansion to southern and western settlements and supported the emergence of new communities along the corridors. *"Instead of gradually extending the city, they created little villages around their stations a couple miles apart—railroad suburbs."* *(English, 2019, para. 13)*

For the next forty years the Auckland metro rail network remained relatively unchanged. However, plans and funding for modernisation of the city system were approved in 1924, involving electrification and an inner-city loop now known as the Morningside Deviation. *(New Zealand Herald, 1924)*
Also approved at this time was the Westfield Deviation (Eastern Line) which opened in 1930, becoming the new route for the Main Trunk Line, allowing for increased freight and passenger movement and opening much of the land in the inner east for new development. *(New Zealand Herald, 1924)*

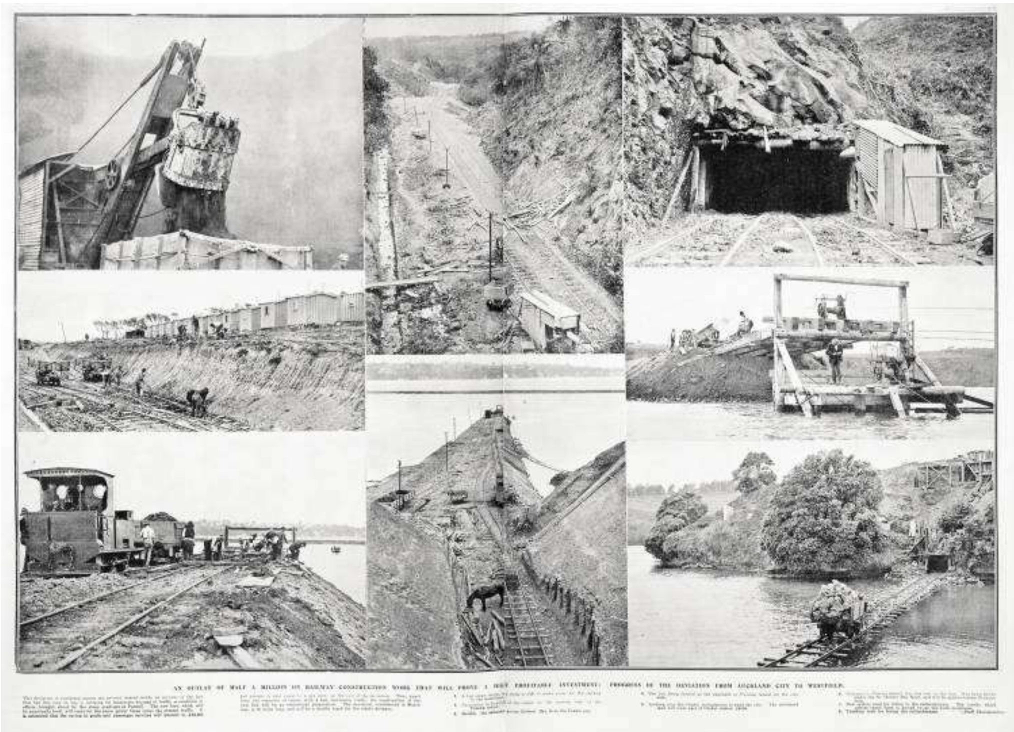

Figure 11: Progress of the Deviation from Auckland City to Westfield
SOURCE: Auckland Libraries Heritage Collections AWNS-19251029-47-01

However, at the same time as the successful opening of the Westfield Deviation, plans for the Morningside Deviation and electrification that were to follow, were cancelled by the Government due to the £2,174,570 price, which was almost a quarter of the whole country's railway budget at the time. *Auckland Star, Issue 243 (1930)*

"Because of engineering difficulties, the high cost of electrification, the fact that there would be no substantial saving in goods haulage, and the unpromising future of suburban railway transport, the Government has decided to abandon the Morningside railway deviation and tunnel scheme." *Auckland Star, Issue 15 (1930)*

Throughout the 1930s, through Government unemployment relief, workers were deployed across the country to complete public works. In Auckland, this included double tracking of the main line, south to Papakura completed in 1931, and to Paerata in 1939. The Morningside Deviation was once again proposed in 1937 *"as a way to reduce unemployment but the war loomed."* *History - City Rail Link, (n.d.)*

Figure 12: Duplication of the Papatoetoe to Papakura railway line.
SOURCE: Auckland Star, Issue 241, 11 October 1929, Page 8

However, during the early 20th century, the new and most popular form of urban transport were the electric tramways (1902–1956). Originally built and operated as horse-drawn tramways between 1884-1902, these routes were soon electrified and expanded, playing a vital role in growing the city boundaries to create the inner suburbs such as Mount Eden, Point Chevalier, and Mt Albert. *"By 1938, there were 71 km of tramways in Auckland" New Zealand Herald (1938).*

Unlike heavy rail, the tramways, with their frequent stops and faster electric acceleration, enabled a continuous outward expansion of the urban fabric. *"A walking city 2 miles in diameter covered only a little over 3 square miles; a streetcar city 8 miles in diameter could cover 50 square miles. It was the first great mass-market suburban boom." (English, 2019, para. 17)*

During this era, Auckland's built area remained largely contained within the central isthmus, with compact, walkable communities developing around tram stops and train stations. Local businesses clustered in these areas, providing convenient access for local residents, while the rail and tram networks offered a direct route to the city centre.

Figure 13: Leightons street map of Auckland City and suburbs (1930)
SOURCE: Auckland Libraries Heritage Collections Map 6409

2.2 Ministry of Works Report 1946

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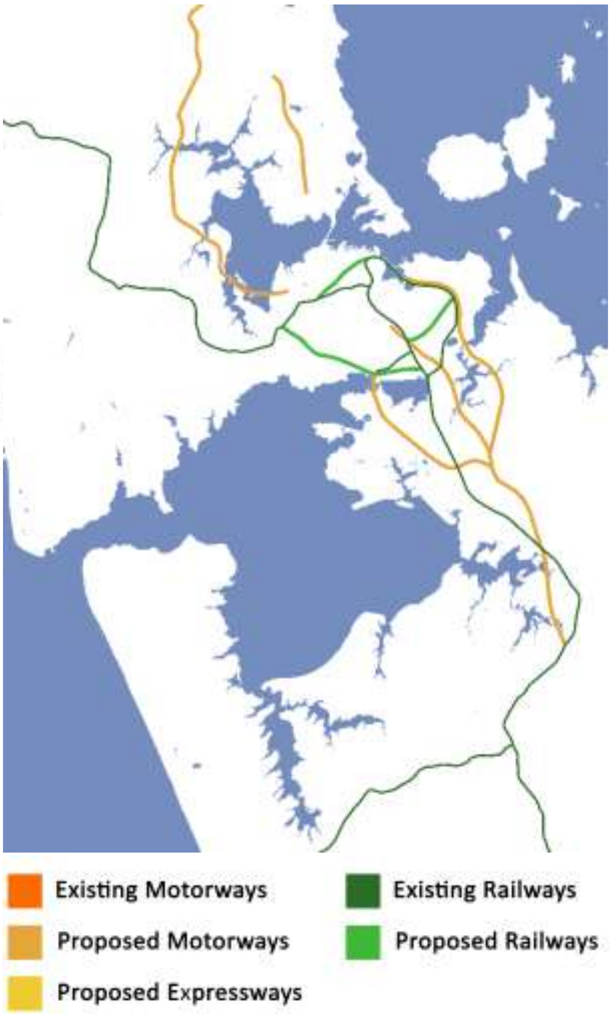


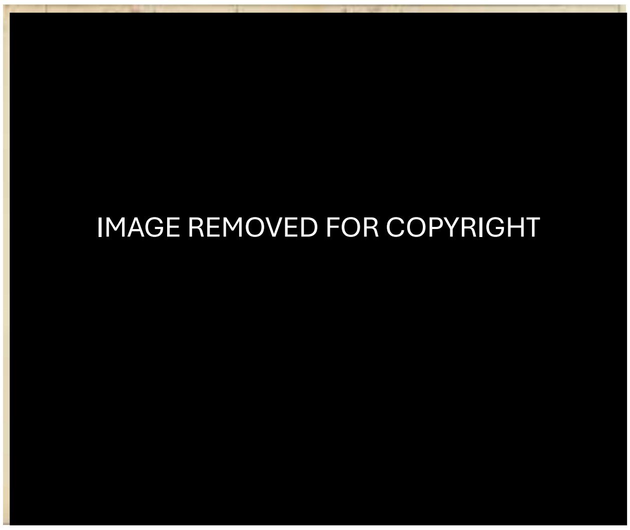
Figure 14: (Left) Statutory Regional Plan for Auckland, from MOW (1946).
SOURCE: Lost City: Forgotten Plans for an Alternative Auckland, Chris Harris
Figure 15: (Right) Statutory Regional Plan for Auckland - Recreation Highlighting Transport Corridors

As the Second World War came to an end, enthusiasm remained to proceed with the Morningside Deviation, which was now viewed as a *"post-war project that could employ many returning servicemen"* *(Mexsom, 2021).*

Plans released by the Ministry of Works *(Figure 14)* in 1946 aimed to further expand and modernise both the Auckland and Wellington metropolitan rail networks, following the recent success of electrification and service improvements in the Wellington Region. The proposed works included the electrification of main lines, construction of the Morningside Deviation, the Avondale-Southdown line, and a Glen Innes-Penrose line *(Ministry of Works, 1946, p. 35)*. Although these lines were never built, they were once again recommended in 1949 by British consultants Halcrow and Thomas.

However, this report was also the first major plan to propose a new system of urban highways and roading infrastructure across the city, serving as a precursor to Auckland's current transport network. The routes of these highways however, differed significantly from the plans that followed. While they generally followed similar alignments to today's motorway system, the key distinction was that they would approach the central isthmus but stop short of entering the inner urban areas, thereby avoiding disruption to the existing urban fabric and the city centre itself.

2.3 Halcrow and Thomas report 1949



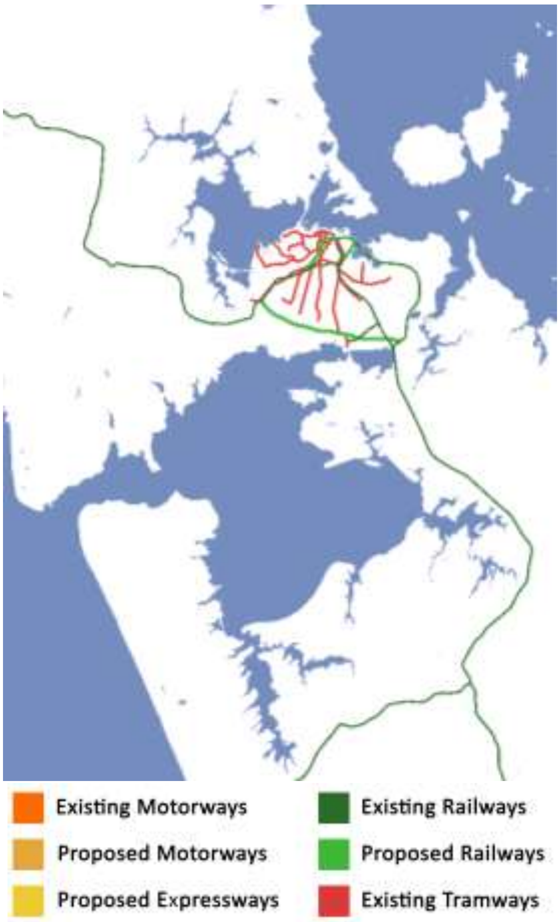


Figure 16: (Left) Scheme 1, as proposed by the Railways Department. Interim Report on Auckland Transport (1949).
SOURCE: How Auckland Ditched Rail for Roads and Rubber Tyres: The tube, Sam Turner-O'Keeffe
Figure 17: (Right) Scheme 1, as proposed by the Railways Department. Recreation Highlighting Transport Corridors

In 1949, the first National Government commissioned two British consultants, Halcrow and Thomas, to report on Auckland's growing traffic problems and propose a rail-based transport *solution. "The national Government viewed the development of Auckland's existing railway system as a potential solution" (Turner-O'Keeffe, 2023).* In the same year, Halcrow and Thomas released their Interim Report on Auckland Transport *(Figure 16)*.

This report focused primarily on expanding and modernising the heavy rail system, with priority given to the Morningside Deviation, while retaining and upgrading the tram and bus network with *"Improved passenger vehicles" (Halcrow & Thomas, 1950, March 14).*

The consultants recommended *"that expenditure upon Arterial streets in Auckland Metropolitan Area be restricted until results of the recommended scheme are seen" (Halcrow & Thomas, 1950, March 14).*

The report also highlighted a sudden policy shift by the government, which began prioritising spending on roads over rail: *"We wish to draw attention here to the recent policy of spending large sums of money upon the roads and but little upon the railways in the country generally" (Halcrow & Thomas, 1950, March 14).*

Furthermore, the report emphasised the long-term efficiency of rail transport: *"After initial capital expenditure, the railway always provides the cheapest form of transport" (Halcrow & Thomas, 1950, March 14).*

3. Post War:

This chapter examines how the rise of private car ownership and motorway construction reshaped Auckland's urban form in the post war period. It traces the transition from compact, transit-supported neighbourhoods to dispersed, car-oriented suburban development. These shifts reveal how road expansion, planning policies, and changing mobility preferences directed Auckland's growth and transformed patterns of movement, land use, and connectivity.

Figure 18:

Figure 19:

3.1 Post War: Rise of the Private Car and Motorways (1951 - 1989):

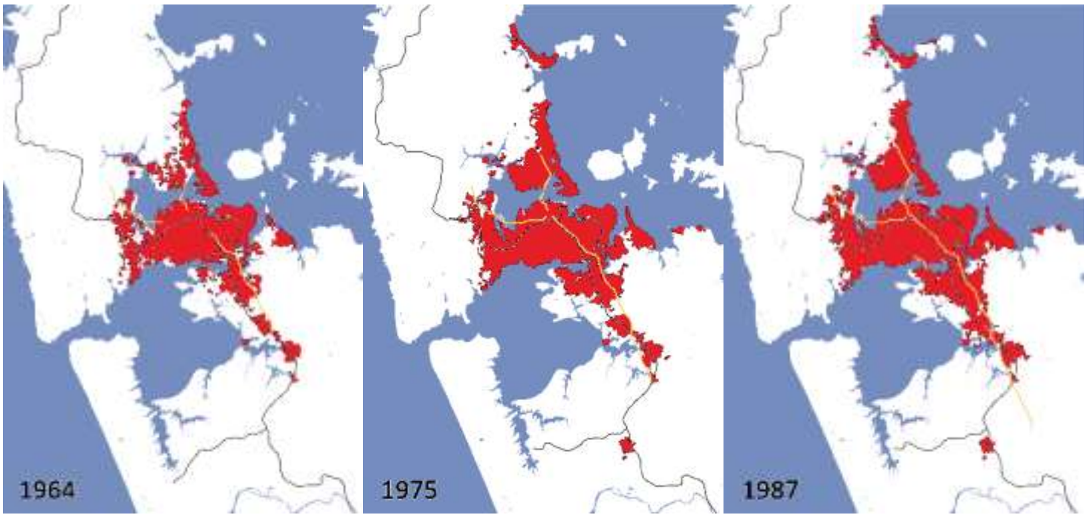


Figure 20: (left) Urban Growth 1964.
Figure 21: (centre) Urban Growth 1975.
Figure 22: (right) Urban Growth 1987.

3.2 Rail vs Road

In the early 1950s, it seemed like plans were finally turning into action with the Halcrow-Thomas report being accepted by both Committee of Enquiry and the Government. “The Minister of Railways Stan Goosman officially confirmed in October 1952 that the Government would go ahead with both suburban rail electrification and the Morningside Deviation.” *Turner-O’Keeffe, S. (2023)*

In 1954 the Morningside Deviation and electrification West to Henderson and South to Papakura was expected to cost a total of £10,876,000 and take five and a half years to complete. *Technical Advisory Committee (1955, July, p.131.)*

3.3 Master transportation plan 1955

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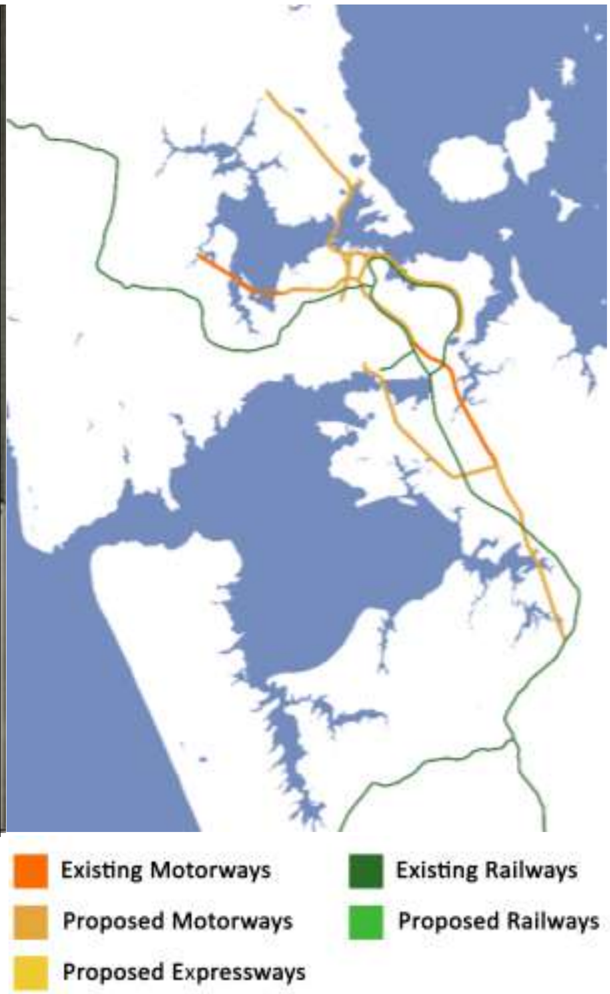

Figure 23: (Left) Metropolitan Highway Development Scheme, from MTP (1955).
SOURCE: Master Transport Plan for Metropolitan Auckland, Auckland Regional Planning Authority
Figure 24: (Right) Metropolitan Highway Development Scheme Recreation Highlighting Transport Corridors

However, that same year, things changed. The same Minister of Railways and Minister of Works, Stan Goosman proposed, *"...that Auckland consider the advisability of giving preference to a system of express motorways into and through the city area, instead of the underground railway project, to which the government was committed."* *Technical Advisory Committee (1955, July, p.3.)*
Auckland City Council engineer, Mr A. J. Dickson, suggested that *"an overall master transportation plan be prepared",* *Technical Advisory Committee (1955, July, p.3.)* that would finally determine whether to complete the long-deferred railway plans or to shift toward a road-focused, private-vehicle transport strategy.

The Auckland City Council voted to request the Auckland Regional Planning Authority take over and make their own report that could finally set in stone a plan for Auckland.
In 1955, the Master Transportation Plan for Metropolitan Auckland *(Figure 23)*, prepared by the Auckland Regional Planning Authority, was released and adopted by the Government. Unlike all previous plans, this one emphasised the greater importance of road and urban motorway development at the expense of the rail network.

"An urban transportation Plan for Auckland must be based on the development of-
(a) urban motorways
(b) existing main traffic routes
(c) parking facilities
(d) passenger and freight terminal facilities
(e) public passenger transport services" *Technical Advisory Committee (1955, July, p.31.)*

Although finding a clear reason for the sudden shift from rail to road is difficult, it is worth noting that Mr A. J. Dickson, as well as many of the committee members at the Auckland Regional Planning Authority, were pro-motorway advocates.

There was also a significant conflict of interest involving the then Minister of Railways and Works, Stan Goosman, who personally owned W. S. Goosman and Company. His company specialised in road freight transportation, road construction, and quarrying for roading. It could be strongly argued that Goosman stood to benefit from the sudden redirection of government funds toward road infrastructure.

"From carrying he turned to roading contracts, the first contract handled being a five mile stretch of a road in Waitomo…
…He opened a quarry at Motohora which proved a valuable source of road metal for these operations." *Te Awamutu Courier, Issue 6238 (1946)*

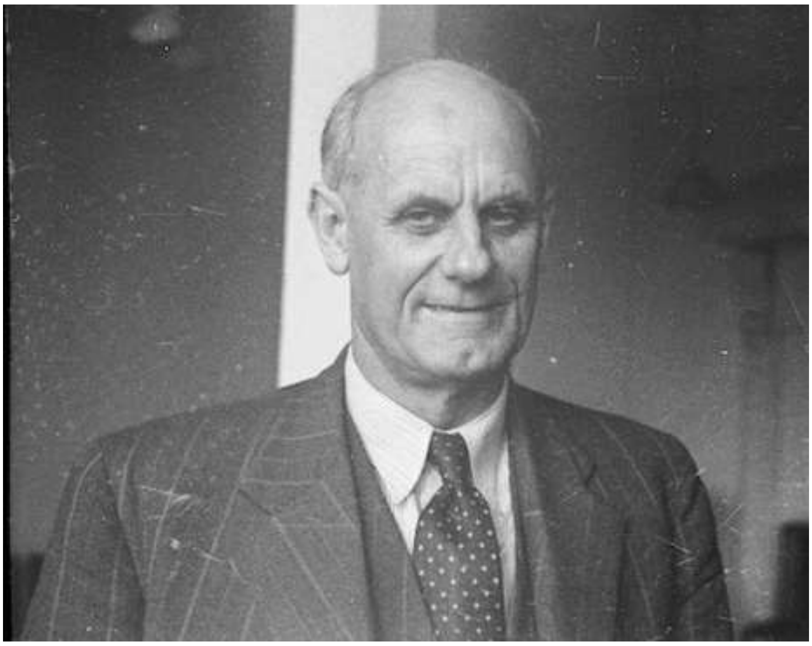

Figure 25: Sir William Stanley Goosman, photographed in 1950 by an Evening Post photographer.
SOURCE: National Library, Reference: 114/210/13/1-F

3.4 Post-War Planning Prioritising Automobile Mobility and Suburban Home Ownership

Following the Second World War, New Zealand's urban planning began to shift dramatically. *"The increasing reliance on personal vehicles, along with lenient government lending policies, allowed people to fulfil their desire of detached houses on large lots leading to rapid suburban expansion and a dispersed urban form" (Hoffman, 2019).*

As suburban growth accelerated, *"much larger areas of land became available for housing development. Whole cities were turned inside-out as their populations moved from the centre to the edges" (Derby, 2010).*

These new suburban environments were a clear departure from the traditional inner-city suburbs of the 19th and early 20th century. In those earlier neighbourhoods, streets functioned as shared social spaces where children played and neighbours gathered. Instead, these new post-war suburbs were, *"dominated by private vehicles, and children and pedestrians kept to the footpaths" (Derby, 2010).*
The rise of car ownership reshaped both the design of streets and the way people interacted with public space between their neighbours.

"After the Second World War the urgency of the housing shortage meant that nearly all development funding went into building houses, and little attention was paid to supplying the new housing estates with community facilities or public transport" (Derby, 2010). This focus on housing over infrastructure resulted in residents needing to travel longer distances to access pre-existing community facilities, worsening traffic in these neighbourhoods and further entrenching car dependency.

By the 1970s, *"the quarter-acre ideal changed towards a more intensive and varied pattern of suburban housing. In many cities local authorities permitted smaller sections, less room between dwellings and infill housing" (Derby, 2010).*

As urban form continued to evolve, shopping malls and suburban shopping centres began to replace traditional main streets. Consequently, *"patterns of development changed from rectangular street networks and linear shopping centres with a pedestrian focus to crescents and cul-de-sacs, oriented towards the private motor vehicle" (Hoffman, 2019).* These post-war priorities and planning decisions, shaped by decades of transport and housing policy, laid the foundations for Auckland's modern suburban landscape, which is spatially dispersed and car dependent.

IMAGE REMOVED FOR COPYRIGHT

Figure 26: Southern Motorway construction, Ellerslie, Auckland, 1959
SOURCE: Auckland Libraries Heritage Collections 1370-279-22
Figure 27: Aerial view of Southern Motorway construction, Takanini, 1961
SOURCE: Auckland Libraries Heritage Collections 1370-029-09-02

3.5 Robbie's Rapid Rail 1974

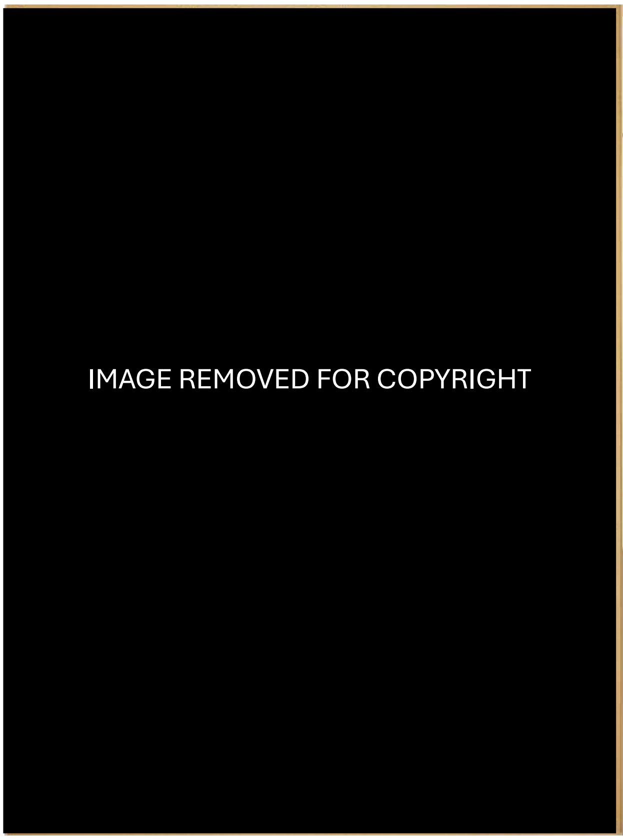

Figure 28: Robbie's Rapid Rail, A.R.T Alignment
Figure 29: Robbie's Rapid Rail, A.R.T Alignment Recreation Highlighting Transport Corridors

Existing Motorways
Existing Railways
Proposed Railways

One of the most well-known public transport proposals in Auckland's history, and indeed in New Zealand as a whole, was the Auckland Rapid Transit (ART) plan, which became locally known as Robbie's Rapid Rail. Initially a strong advocate for expanding Auckland's motorway network, Mayor Dove-Myer Robinson had, by the late 1960s, become convinced that the city urgently needed to develop a rapid rail metro system *(Figure 28) (Brett, 2021, p. 224).*

In articles written for the New Zealand Herald in 1975, Robinson stated that the Auckland motorway network *"was expected to be completed by 1970, but as a result of shortage of National Roads Board finance, work slowed down and the whole plan is not now expected to be completed until the year 2010 — at least 40 years behind schedule." (Lowrie, 2016).*

By 1964, it had already become apparent that even when completed, the isthmus motorway and roading system would be unable to cope with the rapidly increasing number of vehicles projected for Auckland in the coming years *(Lowrie, 2016).*

Progress on the ART plan was initially slow due to disagreements between local councils over proposed routes and station locations, as well as a lack of enthusiasm from New Zealand Railways (NZR), which prioritised freight operations and feared competition from passenger services *(Brett, 2021, p. 224).*

In 1973, however, the Labour Government approved funding to electrify the Southern Line to Papakura as an initial stage of the rapid transit proposal. The following year, a committee was established to review Auckland's bus and rail services, resulting in the development of a comprehensive proposal for an integrated rapid transit system *(Seehear Films, 1975).*

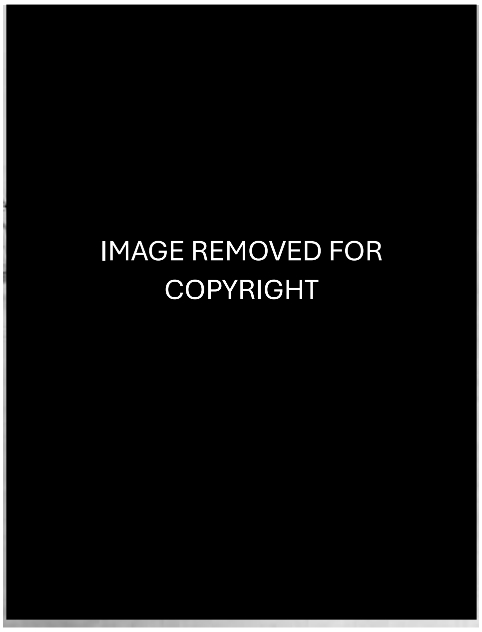

Figure 30: AART Directorate. (1974, September). Auckland Rapid Transit: Report to government, Stage 1, Part 1 Chapter 4, Plate 15) [Government report].

Stage One of the plan, as outlined in the 1974 report by the ART Directorate to the Government, proposed the electrification and modernisation of the Southern and Eastern rail lines, along with the construction of an underground loop through the central city. The concept was inspired by earlier work by consultants Halcrow and Thomas. Robinson described it *as "an electrified railway, underground in parts, with trains fanning out every three minutes from central Auckland to the outer suburbs."* *(City Rail Link Ltd., 2021)*

This report represented the most detailed proposal for expanding Auckland's rail network since 1949. However, following the sudden death of Prime Minister Norman Kirk in 1974, the Labour Government paused progress on the project in mid-1975 ahead of the general *election (Brett, 2021, p. 224).* Labour went on to lose the election that November, and the incoming National Government, led by Robert Muldoon, cancelled the scheme and renewed its focus on expanding Auckland's motorway network.

Figure 31: A Platform for the Future: Auckland Rapid Transit. 2019 [Exhibition, subject date 1969].
SOURCE: The Museum of Transport and Technology (MOTAT).

4. New Millenium:

This chapter examines how Auckland entered the new millennium with deeply entrenched car dependency, shaped by decades of motorway expansion and dispersed suburban growth. At the same time, it traces the early emergence of change across the transport system and the urban environment. These shifts included the gradual revival of the rail network, growing investment in public transport infrastructure and intensification encouraged by planning reforms. The chapter highlights how Auckland's transport and urban form became a contested space between continued car dominance and the early foundations of a more connected, transit-oriented, and compact urban future.

IMAGE REMOVED FOR COPYRIGHT

Figure 32: Collage Entrenchment of Car Dependency + Change?

Figure 33:

4.1 Entrenchment of Car Dependency and Signs of Change

Figure 34: (left) Urban Growth 1987
Figure 35: (centre) Urban Growth 2008
Figure 36: (right) Urban Growth 2014

By the late 1980s, Auckland's rail network was in serious decline. The system was still operating carriages built in 1936, hauled by ageing locomotives *(Figure 37)*, while many stations were dilapidated, unsafe, and frequently targeted by arson *(Lowrie, 2018).* Railway patronage had fallen to barely over 1 million annually, marking a tipping point in the early 1990s *(Lowrie, 2014).*

During the 1990s, the highest population growth in the Auckland region occurred in Rodney District, followed by Manukau City and Franklin District, reflecting a continued trend of peripheral growth. However, much of this growth was infill on vacant land within the existing urban boundary *(Hoffman, 2019)*. Between 1991 and 2001, an estimated 52-62% of annual metropolitan residential growth occurred within already urbanised areas *(Hoffman, 2019).*

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IMAGE REMOVED FOR COPYRIGHT

Figure 37: (top left) Suburban Railway Services, Greenlane, 1990s? [Photograph]

SOURCE: Auckland Libraries Heritage Collections 1108-063
Figure 38 (top right): Mount Eden Railway Station, 1989 [Photograph]
SOURCE: Auckland Libraries Heritage Collections 273-WES106-09
Figure 39: (bottom left) Morningside Railway Station, 1989 [Photograph]
SOURCE: Auckland Libraries Heritage Collections 273-PAG043-12
Figure 40: (bottom right) Glen Innes Railway Station graffiti, 1989 [Photograph]
SOURCE: Auckland Libraries Heritage Collections 273-PAG004-03

In 1991, new legislation shifted the focus of public transport from being treated as a social service to being financially sustainable, requiring the system to operate commercially *(Lowrie, 2018).* General Manager of CityRail, Raymond Siddalls was initially tasked with shutting down the Auckland network, but a restructure allowed him to reduce operating costs and extend the operations contract for a further four years from 1992 *(Lowrie, 2018).*

At the same time, the city of Perth was nearing completion of electrifying its suburban rail network. A railway staff member visiting Perth was asked to investigate the fate of the old diesel rolling stock *(Figure 41)*. With no plans to preserve the trains, Siddalls immediately arranged to secure 19 of them, which were acquired for scrap value *(Lowrie, 2018).* Within just three years, rail patronage in Auckland had doubled to 2 million annually *(Lowrie, 2014).*

IMAGE REMOVED FOR COPYRIGHT

Figure 41: Left: ADL class DMU. Train at Auckland Railway Station, 1990s? [Photograph]
SOURCE: Auckland Libraries Heritage Collections 273-WES106-09
Figure 42: Right: Refurbished ADL class DMU's Pukekohe railway yard. 2017 [Photograph]
SOURCE: @the_rail_life [Profile]. Mastodon

During the first decade of the 21st century, Auckland's development shifted from primarily peripheral growth to intensification through infill, redevelopment, and development of remaining vacant lots within the Metropolitan Urban Limit *(Hoffman, 2019).* The inner-city resident population increased significantly between 1991 and 2006, reaching over 17,000 residents *(Hoffman, 2019).*

Plans for reopening a railway terminus at Britomart were first tabled in 1990 by Siddalls, who ensured a corridor was preserved when the railway yards were sold *(Lowrie, 2018).* In November 2000, the winning design for the Britomart Transport Centre was announced, bringing rail back to Queen Street *(Orsman, 2000).* After years of controversy, the $211 million station opened on 7 July 2003 *(Aronson, 2003),* and rail patronage surged, reaching 10 million by 2011 *(Lowrie, 2023),* alongside wider network improvements *(Figure 43)*.

Figure 43: Historic Auckland Rail Ridership
Greater Auckland. (2023, November 2).

The 2010s saw the impact of a housing supply crisis, with prices across the country and particularly in Auckland skyrocketing. Building consents had plummeted in 2005, reaching their lowest point in 2009 *(Lowrie, 2021).* When urban planning policies restrict development, it can contribute to higher housing prices and reduced supply over time *(New Zealand Infrastructure Commission, 2022).*

In 2007, major transport projects were completed, including the Central Motorway Junction and Grafton Gully, alongside funding announced for electrification of the railway network *(City Rail Link Ltd., 2022).* In 2009, the Northern Busway opened. Following the election of the Fifth National Government in 2008, road funding increased significantly after a decade of relative stagnation, enabling projects such as the Manukau Extension (SH20) and Victoria Park Tunnel (SH1), while the Waterview Connection, completing the Western Ring Route, opened in 2017 *(Hoffman, 2019).*

In 2010, Auckland was amalgamated under a single council. The first Auckland Plan, published in 2012, presented a consolidated vision for the city's spatial development, emphasising a *"quality compact urban form" (Hoffman, 2019).* Construction of the City Rail Link finally broke ground in 2017, with plans to open in 2026, 103 years after it was first proposed.

In recent years, Auckland has shifted from an under-supply to an over-supply of housing, and prices have stabilised. The typology of housing in Auckland has changed over time *(Figure 44)*. Prior to 2009, the most common building consents were for single houses. Following the lifting of zoning restrictions with the enactment of the Unitary Plan in 2016, townhouses experienced a significant boom, becoming the dominant form of new housing by 2020 *(Lowrie, 2021).*

Figure 44: How big is our housing shortfall?
Greater Auckland (2021, February 16)

4.2 Proposed Rapid Transit Network 2016 (RTN)

In 2016, following approval of the City Rail Link (CRL), Auckland Transport released a 30-year plan outlining a multi-modal transport system for the region. The plan focused on completing the CRL and extending connectivity across the wider metropolitan area through bus rapid transit (BRT) and future street running light rail *(Figure 45)*.

However, the report acknowledged that the CRL alone would not improve access from the north, the central and southern isthmus, or key destinations such as the universities and Wynyard Quarter (*Auckland Transport, 2015*). It also warned that relying solely on bus investment would only meet demand for a limited time, and that without light rail, *"buses from non-rail areas will create significant congestion" (Auckland Transport, 2015).*

Figure 45:
Proposed rapid transit network: Future maps
Auckland Transport. (2016, April 11).

4.3 2023 Auckland Light Rail (ALR)

In 2017, the Labour Government took control of the street-running light rail proposal from Auckland Council, making it a key transport policy in the election *(Sommerville, 2024).* With extensive design work handed over by Auckland Transport, Waka Kotahi, under orders from Transport Minister Phil Twyford, was prepared to begin delivery of the project *(Matt, 2023).*
However, political disagreements between Labour and their coalition partner NZ First, alternative proposals, and delays caused by Covid-19 stalled progress. Work finally restarted in 2021 when new Transport Minister Michael Wood reset the project and began development from scratch.

Despite this, few details were made public, and no specific route, mode, or phased plan had been confirmed. Development largely involved ongoing community and private consultation, without visible plans or tangible progress. As the project evolved and the next election approached, the scope expanded to include a cross-harbour connection to the North Shore, and the mode shifted from street-running trams to a fully grade-separated autonomous metro. This mega-project was projected to cost $21–27 billion *(Labour's Auckland Harbour Crossing 'absurd', 2023),* excluding the existing plan between the CBD and Auckland Airport. The proposed route was winding and indirect, attempting to serve as many locations as possible with a single line *(Figure 46)*, violating a key principle of public transport planning:

"An efficient transit line and, hence, one that will support good service connects multiple points but is also reasonably straight so that it's perceived as a direct route between any two points on the line…" (Walker, 2011).

By 2024, when the new National Government came to power, the project was scrapped completely. As Matt Lowrie of Greater Auckland noted, the project was, *"Further from becoming a reality in 2023 than it was when they [Labour] took it over in 2017."*

IMAGE REMOVED FOR COPYRIGHT

Figure 46: AUCKLAND LIGHT RAIL City Centre to Māngere. ALR Ltd. (n.d.). ALR route map (Left)
Figure 47: Auckland's future rapid transit network. *ALR Ltd. (n.d.). Future proofing & integration (Right)*

4.4 2025 Auckland Rapid Transit Pathway (ARTP)

With the Auckland City Rail Link scheduled to open in 2026, the Auckland Rapid Transit Plan (ARTP) provides a coordinated pathway for how rapid transit projects can integrate with the wider transport network (Auckland Transport, 2025). The plan combines existing strategies to guide long-term investment and outlines how the region can continue developing the network despite future uncertainties. It also highlights how staged and interim improvements can deliver benefits early (Auckland Transport, 2025).

First published in 2023, the ARTP was updated in 2025 with a stronger emphasis on phased and incremental upgrades *(Figure 48)*. This approach marks a clear shift from the Labour Governments earlier light rail proposal, which attempted to deliver a single large-scale project opening all at once. Instead, the ARTP focuses on establishing workable first steps and then making gradual improvements over time, allowing the network to grow in a more manageable and adaptive way. As Auckland Transport notes, "*Phase 1 is focused on improving what we've got and delivering new rapid transit network along several new corridors"* (Auckland Transport, 2025).

IMAGE REMOVED FOR COPYRIGHT

Figure 48:
Schematic of the long-term network laid out in the Auckland Rapid Transit Pathway.
Auckland Transport. (2025, March 28).

5. Current Transport Technologies and Development Potential

After examining the history of transport technologies in Auckland, it becomes clear how past decisions and developments have shaped the city's current urban form and mobility patterns. Building on this understanding, the following section explores present and emerging transport options that have the potential to influence Auckland's growth and regeneration in the coming decades. The focus will be primarily on established and realistically achievable modes of transport, rather than speculative Gadgetbahn technologies (A public transport concept promoted as futuristic or innovative, but often less feasible, reliable, or cost-effective than traditional modes), to assess how they can contribute to a more sustainable, connected, and resilient urban environment.

5.1 Bus Rapid Transit / High-capacity bus

Bus Rapid Transit (BRT) systems use conventional buses operating on dedicated corridors to bypass traffic congestion. These systems typically include signal priority and can vary greatly in the level of supporting infrastructure. Basic BRT systems, such as bus lanes with camera enforcement to prevent other vehicles from blocking the route, provide a cost-effective way to enable higher-capacity buses to move efficiently through congested areas. This type of system can be seen across Auckland, most notably on main arterial streets within the central isthmus, such as Dominion Road. These lanes may operate permanently (24/7) or only during peak hours, as is the case in most parts of Auckland. A key limitation of this model is that road corridors generally need to be at least four lanes wide to reallocate space for bus-only lanes.

More advanced BRT systems feature fully dedicated corridors, such as Auckland's established Northern Busway on the North Shore *(Figure 49)* and the Eastern Busway, which currently operates between Panmure and Pakuranga and is being extended to Botany. This form of BRT requires constructing new roads exclusively for buses, which comes at a high initial cost for land purchasing and construction, as well as ongoing road maintenance. The separation from general traffic, however, allows for larger bus stops, passing lanes for express services, and greater reliability. Stops are spaced further apart and function more like stations or hubs for development, supporting transit-oriented growth.

Both of Auckland's BRT systems use conventional or double-decker buses, which can carry up to 100 passengers *(Auckland Transport, 2025).* There is also the potential to adopt high-capacity bi-articulated buses, which resemble trams on rubber wheels and can carry up to 180 passengers. These vehicles are already in operation in cities such as Brisbane *(Auckland Transport, 2025).*

IMAGE REMOVED FOR COPYRIGHT

Figure 49: Auckland Transport (2021) Investment to future-proof Auckland's Northern Busway [Photograph*]*

5.2 Light rail / Tram

Reintroducing light rail and tram systems along Auckland's busiest transport corridors offers an opportunity to reclaim streets for clean, people-oriented mobility. Unlike their early 20th-century predecessors, modern trams feature advanced driving technologies, a variety of power supply options, and contemporary design standards such as accessible low-floor boarding, longer high-capacity vehicles, and improved speed. These upgrades make them far more efficient, comfortable, and reliable than earlier models and have the ability to move a far greater amount of people than bus rapid transit.

Operating within dedicated corridors and guideways, light rail systems are more human-scaled and less intimidating for pedestrians, with predictable movements that make them easier to share the street with than modern buses *(Figure 50)*. Modern light rail networks also benefit from signal priority over cars at intersections, reducing delays and maintaining consistent timetables.

This is achieved with significantly fewer vehicles and drivers, increased passenger comfort, and easy adaptability to patronage growth by increasing service frequency or lengthening rolling stock, boosting the *"capacity to move up to 13,500 commuters per hour" (Mariamas, 2019).* Light rail vehicles generally carry around 200 to 400 passengers per vehicle *(Auckland Transport, 2025*), making them an efficient and scalable solution for high-demand transport corridors.

Figure 50: Broadsheet. (2020). How to ride Sydney's new light rail like a pro [Photograph].

5.3 Heavy Rail / Suburban Train

The railway network currently operating in Auckland *(Figure 51)* and across Aotearoa New Zealand is heavy rail. Heavy rail typically uses mainline rolling stock and is subject to stricter regulations, signalling systems, and safety standards due to its higher speeds, larger vehicles, and shared use with freight and regional trains. Heavy rail has priority over all other modes of transport and may run either at grade or on grade-separated tracks. Auckland's suburban heavy rail system connects outer suburbs to the city centre, covering large distances at relatively high speeds. This differs from metro or subway systems, which usually operate within the urban core and nearby inner suburbs. Heavy rail is the highest-capacity mode of land transport, with Auckland's trains capable of carrying between 750 and 1,100 passengers per vehicle (depending on length) *(Auckland Transport, 2025*) and reaching speeds of up to 110 km/h.

Conversion to more metro-like operations is achievable through targeted infrastructure and technological investment. Initiatives such as track grade separation from roads and pedestrian areas, level crossing removals, and the segregation of freight operations reduce risks of accidents and operational conflicts. These improvements also create the potential for driver-assisted or fully driverless operation, enabling higher service frequencies, improved safety, and greater network reliability.

Heavy rail, while offering high capacity and speed, unfortunately requires some of the highest initial infrastructure investment. In Auckland, the development of new heavy rail lines appears unlikely in the near future due to capacity constraints within the City Rail Link tunnels.

Future investment in the heavy rail network is therefore expected to focus on enhancing existing services rather than expanding the network, aside from the potential Avondale - Southdown corridor that KiwiRail already owns. Service improvements, such as adding extra track capacity, would enable express trains to operate alongside all-stop suburban services. This would significantly reduce travel times, with journeys from the outermost station in Pukekohe decreasing from 75 minutes to just 45 minutes *(KiwiRail, 2024).*

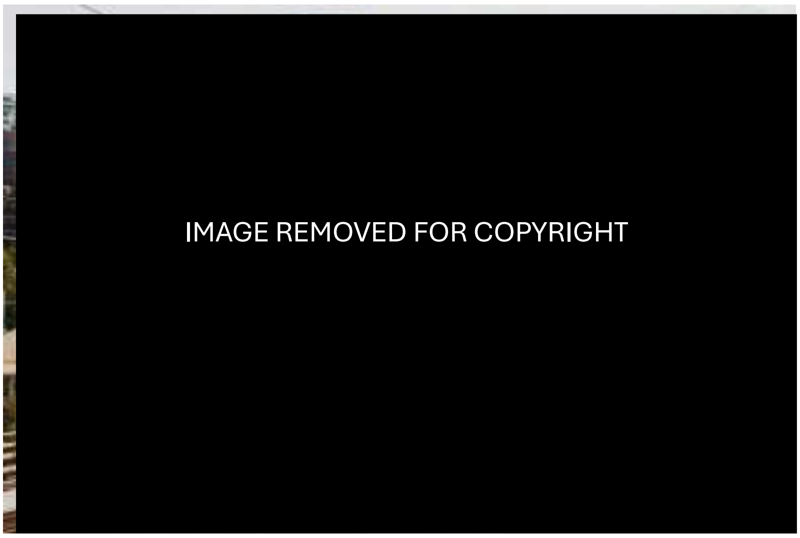


Figure 51: Jonty Victor. (2014). EMU Launch [Photograph].

5.4 Metro

Metro systems are typically the backbone of urban transport. With human operated vehicles as well as autonomous, driverless operations, these systems offer increased frequency, lower operational costs, and improved safety. Autonomous metros are a proven technology, first *"inaugurated in 1981, in Kobe, Japan."* *(Grey, 2020)* That was widely adopted around the world for new systems of the time. As author Grey states, *"The first 500km of automated lines were built over the span of 29 years; once the technology was proven, it took only eight years to double that figure..."*
"...no city that welcomed an automated metro line has ever reverted back to a conventional system." *(Grey, 2020)*

Cities around the world, notably Sydney *(Figure 52)* and Honolulu, are expanding their public transport networks through the development of modern, high-frequency metro systems. These systems are fully grade-separated operating on dedicated tracks either above or below ground, which eliminates conflicts with pedestrians and road traffic allowing for autonomous and high frequency operations. Metro capacities are typically around 400 to 600 passengers per train *(Auckland Transport, 2025)*

For growing cities like Tāmaki Makaurau / Auckland, expanding and modernising metro systems will be essential for high demand travel routes and accommodating urban growth and sustainable travel over greater distances. With driverless technology, this allows operators to increase frequencies to as little as every two minutes in each direction, as can be seen on driverless systems in cities such as Vancouver, *"using three-vehicle train at 240-second headways on each of the Richmond and Airport segments and overlapping for 120-second headway."* *(Canada Line Construction Environmental Management Plan, 2005.)*

IMAGE REMOVED FOR COPYRIGHT

Figure 52: ANP, (2024). Sydney Metro inaugurates its new City line. [Photograph].

5.5 Active Travel / Micro Mobility

Active travel refers to any form of transport that requires physical effort, most commonly walking and cycling. Micro-mobility, on the other hand, involves small, lightweight vehicles such as bicycles and scooters, which are often mechanically or electrically assisted (e.g., e-scooters and e-bikes), enabling users to cover greater distances. Research shows that e-bike riders travel 13% farther than those on conventional bicycles (Yang et al., 2024).

Active travel allows people to move directly to their destination, unlike most public transport services, and can also provide an effective first or last mile link to rapid transit. As Walker and Jarrett (2011) note, *"the bicycle becomes an ideal tool for extending the reach of a rapid transit station"*. Cycling can compete with local transit for short trips, but it generally complements longer-distance rapid transit, particularly when secure bicycle storage is provided at stations *(Walker & Jarrett, 2011). "Walking is an intrinsic feature of almost all transit trips" (Walker & Jarrett, 2011),* and bicycles can cover about 3 km in 10 minutes and 6.5 km in a half-hour *(English, 2019, para. 17).*

In Auckland, 58% of all car trips are under 5 km, and 30% are under 2 km *(Waka Kotahi NZ Transport Agency, n.d.)*. This highlights a significant opportunity: if the majority of private car trips under these distances, particularly those under 2 km, could be shifted to active travel, congestion, emissions, and reliance on private vehicles could be substantially reduced.

Active travel requires relatively low-cost, low-maintenance infrastructure. The key to encouraging uptake is personal comfort and safety, including separation from vehicles, protection from injury and crime, adequate lighting, well-maintained surfaces, connected routes, and destinations located close to one another.

Currently, Auckland has limited cycling infrastructure that forms a connected network, and much of the journey requires sharing the road with cars. The sprawling suburban land use further discourages walking and cycling, as longer distances and vehicle-dominated streets make active travel less inviting. Simple and affordable solutions, such as intensifying land use and reallocating street space for pedestrians and cyclists *(Figure 53)*, can make active transport more practical and attractive.

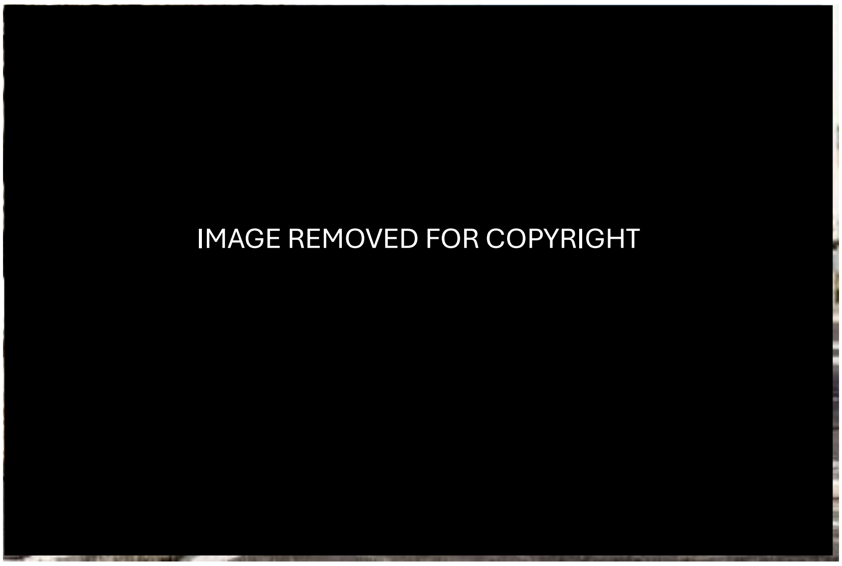


Figure 53: OurAuckland, (2020). Walking and Cycling journeys now available on AT Mobile app. [Photograph].

5.6 Driverless Technology

Autonomous vehicles (AVs) can play a meaningful and practical role in rural and low-density areas where traditional public transport is often too costly or infrequent to be effective. In these areas, fixed-route services such as buses struggle to attract enough passengers to cover the costs and justify regular timetables, reducing the usability of the service for most people, which is then used to justify removal of a service altogether.

On-demand driverless shuttles offer a potential solution, able to operate only when needed and follow flexible routes linking with the nearest town centres or transit hubs. This not only lowers operational costs for councils but also makes public transport more accessible. They also provide travel choice and mobility freedom for people in remote communities particularly elderly, people with disabilities, and individuals without access to a private vehicle. Driverless Technology however, is not a practical mass transit solution, as traffic is a result of low-capacity spatially inefficient vehicles. *"There's just not the physical space in most cities for unlimited free car use" (Millard-Ball, as cited in Griner, 2022).*

Figure 54: (Auckland 'smart village' tests self-driving shuttle system, November 9, 2020)
Figure 55: (California Vote on Self-driving Taxis Could Alter the Future of AI, 2023)

From a safety perspective, AVs have the potential to significantly reduce road fatalities and injuries, which are often higher on rural roads. In New Zealand *"Most road deaths (68%) occurred on rural roads" (International Transport Forum, 2023).*

There is also the practical implementation of this new mode of transport. AV companies like Waymo *(Figure 55)* already operate on a large scale and are now a normal and socially accepted part of transport in the US cities of San Francisco, Los Angelas, Austin, Atlanta and Phoenix and are fast expanding further across the country. However, the implementation of this technology is far more difficult in urban settings due to the amount of information and complex situations the vehicle must interpret and react to.

As stated in the paper, *Reconnecting the rural Autonomous driving as a solution for non-urban mobility,* by consulting firm *Roland Berger, (2018).*
"There are also the strategic benefits of using the rural setting, with its quieter roads and simpler traffic situation..." "...On country roads, the traffic situation is simpler than in cities."
When implemented appropriately, AVs in rural settings can be a practical, life-improving technology that complements broader transport networks while addressing issues of isolation, access, and road safety.

5.7 Ecological transport

Resilient transport infrastructure covers more than just machines and human travel; there are natural aspects that interact with our lives that must also move freely within our cities. Transport infrastructure can be designed not only to withstand climate impacts but also to manage water intelligently. For instance, reconfiguring streets to prioritise pedestrians, cyclists, and public transport allows space to be reallocated for green stormwater systems like rain gardens and bioswales. These features slow and filter runoff, reducing the burden on stormwater networks and preventing flooding in low-lying areas, they can also provide beneficial greenspaces and beautification of local neighbourhoods for residents and wildlife to interact with, acting as community spaces in dry conditions.

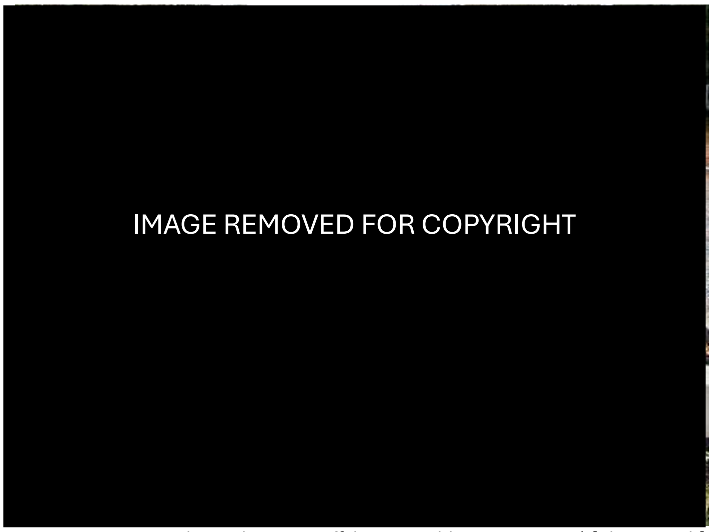


Figure 56 (New Vancouver Rain Garden reduces runoff, boosts public space, 2024.) [Photograph]. The Energy Mix

Flood-resilient transit corridors such as green tram tracks *(Figure 57, 58)* can maintain mobility and reduce the runoff from the streets during high rainfall. Streets can double paths of movement as well as sponges or water channels, redirecting stormwater through urban landscapes safely and visibly.

Figure 57: Green tracks for green cities - Sempergreen. (n.d.). [Photograph].

Figure 58: CrazyD (Combino VAG auf Rasengleis, 2005) [Photograph].

Rail and active transport modes are particularly well suited to environmental and habitat restoration as they require significantly less space than highways or arterial roads and are naturally less disruptive. They can also be designed in parallel with greenways, wetlands, and reforested buffers. Linear rail corridors, for example, can serve dual functions as wildlife corridors, supporting pollinators, and birds, that would otherwise be cut off by car infrastructure. A good example of this within Auckland is “Te Ara ki Uta ki Tai” (The Path to Land and Sea) between Glen Innes and Orakei *(Figure 59, 60, 61).*

Car-dependent design fragments habitats with wide roadways, sprawling car parks, and impermeable surfaces that block wildlife movement and destroy soil health. By reducing the footprint of motor vehicle infrastructure and shifting towards low-impact mobility systems, cities can begin restoring biodiversity.

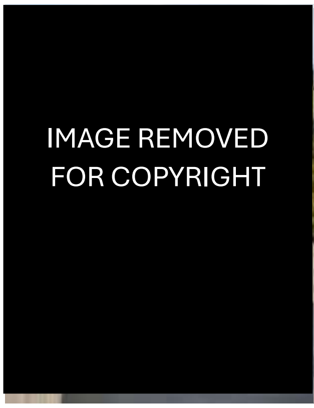


Figure 59: (Te Ara Ki Uta Ki Tai | Glen Innes to Tāmaki Drive Shared Path | Boffa Miskell, 2023.) [Photograph]
Figure 60: Glen Innes to Tāmaki Drive Shared Path

Figure 61: (Glen Innes to Tamaki Drive Shared Path, 2023.) [Photograph]. Nzrailphotos

6. Transit oriented Green Oriented

Transit-oriented development (TOD) seeks to create mixed-use, high-density communities centred around key rapid transit stations, providing residents with both housing and essential services within walkable catchments. As cities face growing populations, TOD offers a sustainable alternative to continuous outward expansion, supporting compact urban growth while maintaining access to reliable, fast, and low-emission public transport for longer journeys.

In Auckland, the City Rail Link, scheduled to open in 2026, is expected to significantly improve accessibility. The number of residents living within 30 minutes of the Auckland CBD will double, with travel time reductions of up to 24 minutes on routes such as Henderson to Te Waihorotiu and 19 minutes on routes such as Ellerslie to Karangahape Road *(Auckland Transport, 2025)*. These improvements are anticipated to attract more people to live within walkable catchments of existing metro stations, strengthening the case for TOD as a tool for sustainable urban densification and enhanced public transport use.

TOD has also emerged as a key component of broader sustainable and 'Smart Growth' urban development strategies. Its success is partly linked to shifting urban living preferences, particularly among younger adults, who increasingly seek to live, work, and socialise within TOD areas rather than in low-density, car-dependent suburbs *(Knowles, Ferbrache, & Nikitas, 2020).*

The relationship between travel behaviour and urban form is reciprocal. In car-centric cities, land use patterns adapt to support private vehicle travel, with residential, commercial, and recreational spaces spatially segregated to accommodate the inefficiencies of car infrastructure. Alternatively, when land use is deliberately designed to separate functions, as seen in conventional suburban developments, people are incentivised to rely on private cars due to the impracticality of alternative transport modes. *Grammenos (2002, p.2)* notes that congestion in conventional suburbs often stems not from street networks themselves but from the segregation and concentration of single land uses, such as regional shopping centres or office parks. This highlights the potential of TOD to integrate land use and transport planning, promoting more sustainable mobility patterns and reduced car dependency.

6.1 Historical Context of TOD

Early twentieth-century TOD patterns were shaped by the characteristics of rail and tram systems. Railway stations were spaced more widely than tram stops, offering faster but less frequent services, with walking serving as the primary access mode in both cases. These early TODs often took the form of compact clusters of housing supported by local schools, shops, and factories *(Knowles et al., 2020).*

However, the rise of the automobile in the mid-twentieth century transformed urban mobility and land use. As *English (2019, para. 32)* explains, the expressway and private car enabled large numbers of people to travel long distances each day, replacing the compact railway suburb with sprawling car-based developments. Whereas the streetcar city covered approximately 50 square miles, the 40-mile-diameter expressway city could extend over 1,250 square miles.

By the 1980s, the downsides of this car-oriented model, including congestion, environmental degradation, and spatial inefficiency, prompted urban planners and researchers to explore alternatives inspired by traditional neighbourhood design *(Ibraeva et al., 2020).* Despite renewed interest in sustainable transport and urban intensification, modern rail and bus rapid transit (BRT) systems still face challenges competing with widespread car ownership in developed cities.

To be effective, public transport networks must offer high frequency, speed, and capacity to rival the flexibility of car travel *(Knowles et al., 2020).* Behavioural change, however, can be slow. Although people may shift modes when viable options are provided, widespread cultural change in mobility preferences may take a generation to emerge. In Auckland, only about 12.4% of the city's urban land area lies within 15-minute walkable zones of its 39 railway stations, illustrating the current limitations of TOD's spatial reach *(Li & Gu, 2025).*

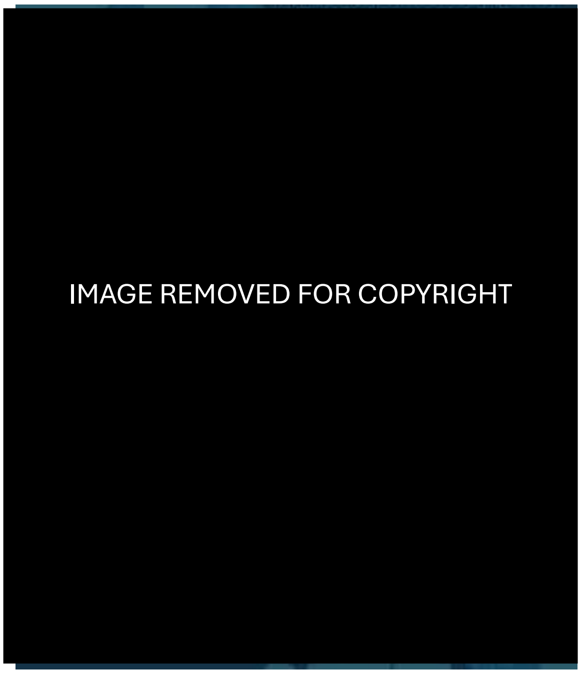


Figure 61: Caldwell, S. (2025, September 29) [@ScootFoundation]. [Image] Twitter. X.

6.2 Greenspace-Oriented Development (GOD)

Recent discourse has expanded TOD to include ecological and social dimensions, giving rise to frameworks such as Greenspace-Oriented Development (GOD) *(Bolleter & Ramalho, 2019; 2020).* This approach links urban density with upgraded green spaces and reasonable access to public transport, aiming to balance compact urban form with ecological and human wellbeing. Concentrating urban densification around green spaces offers a range of benefits, including improved physical and mental health, flood mitigation urban heat island effect, enhanced biodiversity, and cleaner air and water.

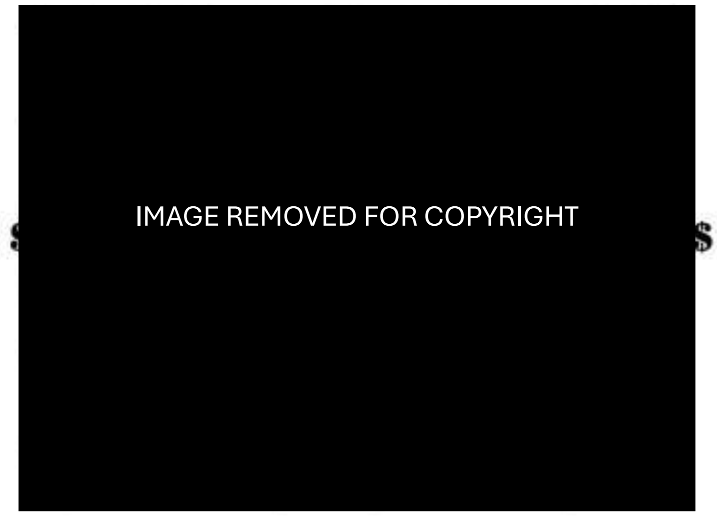


Figure 62: Bolleter, J. (2023). [Image posted on LinkedIn]. LinkedIn

Despite the widespread adoption of TOD ideology across Australia, many cities are failing to meet their infill targets *(Bolleter & Ramalho, 2019).* Bolleter and Ramalho argue that this is partly due to the false assumption that residents are willing to exchange access to nature for the advantages of urban living. Much of the infill that has occurred has been opportunistic, achieved through small-scale subdivision of suburban lots that neither reduces car dependency nor preserves urban forests, while also generating community resistance.

Weaknesses pointed out by GOD advocates highlight the need for larger, neighbourhood-scale planning frameworks that integrate green infrastructure with transport accessibility. This aligns with *Thomas and Bertolini (2020)*, who identify consistent long-term policy support, a stable city-regional vision for land use and transport integration, and high levels of public participation as critical success factors for effective TOD. Together, these perspectives suggest the importance of developing transit-oriented communities that not only promote sustainable mobility but also maintain a strong green outlook and connection to nature.

6.3 Marchetti's Constant

In 1994, Italian physicist Cesare Marchetti introduced the concept now known as the Marchetti Constant, which suggests that humans are generally willing to spend up to one hour commuting each day, or around 30 minutes in each direction. This pattern is observed globally, with average commuting times in European Union countries consistently around or below 30 minutes *(Figure 63) (Eurostat, 2019).*

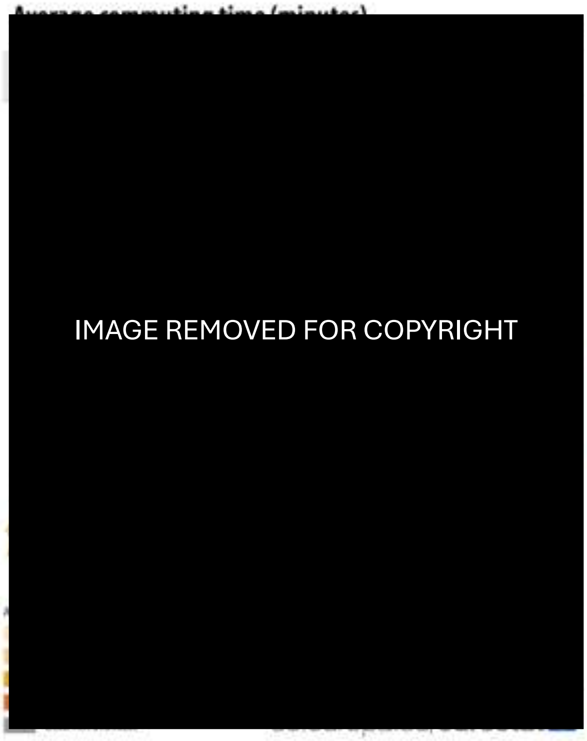


Figure 63: Average commuting time in EU, 2019 (minutes)
SOURCE: Eurostat

This concept has been evident throughout human history in the growth and form of cities. As advances in transport increase the distance people can travel within this 30-minute period, urban areas tend to expand outward. “The physical size of cities is a function of the speed of the transportation technologies that are available. And, as speed increases, cities can occupy more land” *(English, 2019, para. 3).*

In Auckland, this phenomenon is evident in urban sprawl. Following World War II, Auckland's expansion accelerated, merging surrounding towns and suburbs originally developed around suburban railway stations. By the late 1970s, outward growth slowed as development shifted towards infill within the established urban boundary *(Figure 64, 65)*.

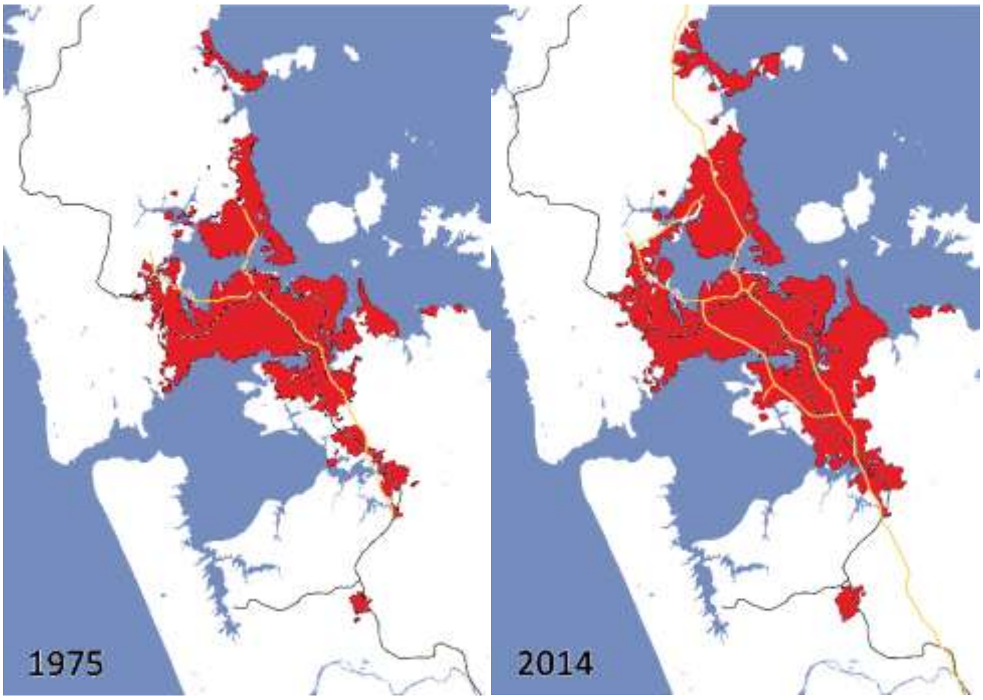


Figure 64: (left) Urban Growth 1975
Figure 65: (right) Urban Growth 2014

Current travel times from the outer edges of Auckland's metropolitan area by car already substantially exceed 30 minutes, indicating limited potential for further outward expansion without reducing travel times. "Even if there is a vast amount of land available in the country, that land has no value in an urban context, unless transportation makes it quickly accessible to the urban core" *(English, 2019, para. 3; Arnett, 2022, para. 5).*

Estimated travel times by car from locations such as Torbay, Orewa, Hobsonville Point, and Drury to Aotea Square illustrate the spatial constraints imposed by existing transport infrastructure *(Figure 66, 67, 68, 69) (Google Maps, 2025).* These constraints further emphasise the importance of TOD and GOD strategies to maximise housing, work and leisure within existing low density urban neighbourhoods close to the city.

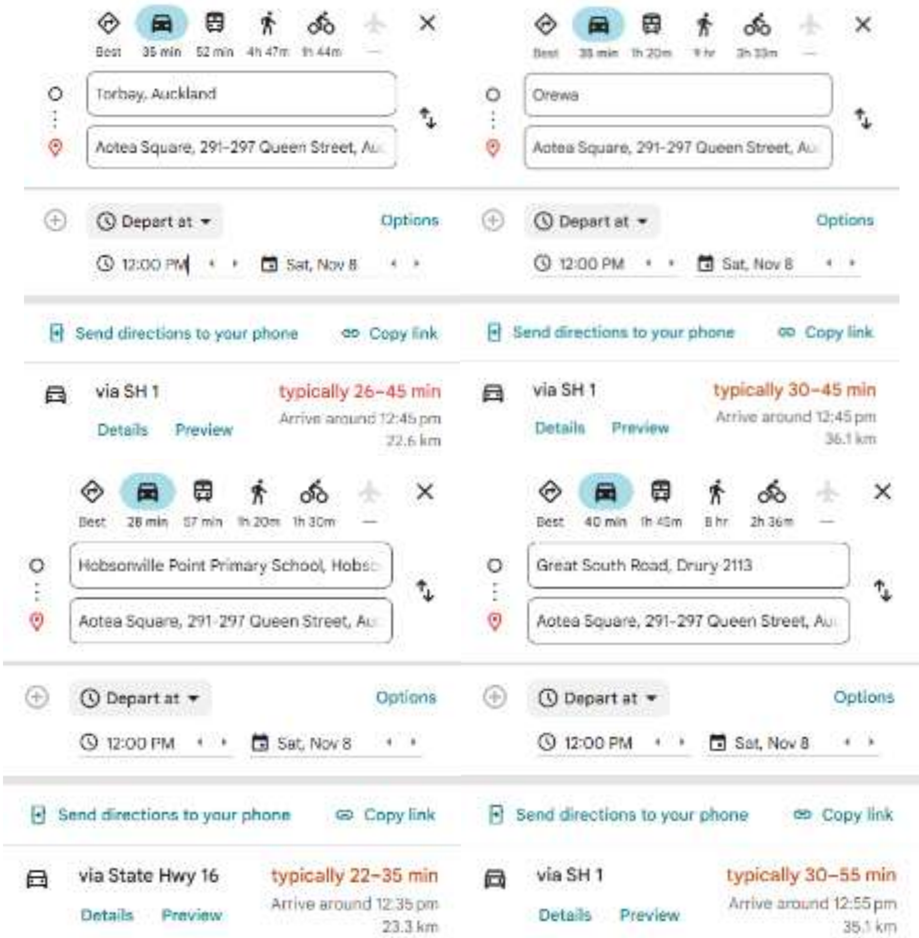


Figure 66: (top left) Torbay-Aotea Square. Figure 67: (top right) Orewa-Aotea Square.
Figure 68: (bottom left) Hobsonville Point-Aotea Square. Figure 69: (bottom right) Drury-Aotea Square.
Estimated travel times by car

6.4 Tactical Urbanism and Urban Wellbeing

Tactical urbanism, first coined in 2010 by New York based architect Mike Lydon *(Anderson, 2023).* Emerged as a response to the limitations of traditional city planning, while effective in overseeing major infrastructure projects such as bridges and highways, is often slow to implement small-scale, local improvements *(Anderson, 2023)*. This approach focuses on short-term, low-cost, and community-driven interventions designed to improve urban spaces and test new ideas before committing to large-scale or permanent changes.

Studies addressing urban health emphasise that the built environment is a key determinant of health. Streets, buildings, and the space in between influence the degree to which residents can adopt healthy lifestyles, such as walking, cycling, and socialising with neighbours (Busciantella-Ricci et al., 2024). Greenery in shared spaces is recognised as an important factor in promoting these healthy lifestyles, encouraging social interaction and inviting people to spend more time outside their private homes (Loughnan, 2025).

The City of Barcelona provides a well-known example of successful tactical urbanism. In several neighbourhoods, streets have been transformed into walkable plazas with outdoor seating, gardens, and green spaces, while car traffic has been significantly reduced or entirely removed. These temporary interventions have often led to permanent changes in how street space is used by people. *(Figure 70)*

Figure 70: Del Rio Bani, D. (2019). Public space, sustainability [Photograph]. Barcelona, Spain.

Similarly, the *Open Streets* initiative more common in North America, temporarily closes streets to traffic, reclaiming public spaces for pedestrians. These events frequently include community activities that encourage people of all ages to engage with their neighbourhoods in a safe and enjoyable way (La Pinta, 2024).

Tactical urbanism projects take many forms, ranging from small-scale street paintings and movable furniture to large public gathering spaces. A well-known example is New York City's Times Square, where a section of the street was painted and filled with chairs and planters, transforming it into a vibrant public space. What was initially a controversial idea, viewed by many as impossible, has since expanded. The approach of closing just one intersection in Times Square is now being applied along the full length of Broadway, with a complete ban on cars between 25th and 27th Streets (Ginsburg, 2023). This shows how temporary tactical interventions in some of the busiest streets in the world, can serve as prototypes for permanent urban transformation, altering both the perception and use of city streets.

In the United Kingdom, the redesign of Broad Street in Oxford, demonstrates how tactical interventions removing access for vehicles with the addition of interactive ground elements have created safer and more attractive play zones for children *(Figure 71, 72)* (Raggett et al., 2022).

Figure 71: Raggett et al. (2022). From Broad Street to Broad Meadow, [Photograph]. Oxford City

The benefits of tactical urbanism are evident not only in social and spatial improvements but also in environmental outcomes. During the COVID-19 lockdowns, a global reduction in vehicle use led to significant declines in air pollution. In Wales, for example, Cardiff experienced a 60% reduction in toxic gases emitted from vehicle exhausts (Fenton, 2020). These results highlight the environmental advantages of reducing car usage in neighbourhoods and reallocating street space for pedestrians and cyclists.

A key principle of tactical urbanism is community involvement. Engaging residents through the process with co-design and participation ensures that interventions reflect local needs and aspirations (Carmichael et al., 2020). Projects that consider how people currently use a space and identify barriers to enjoyment are typically the most successful and resistant to criticism (La Pinta, 2024).

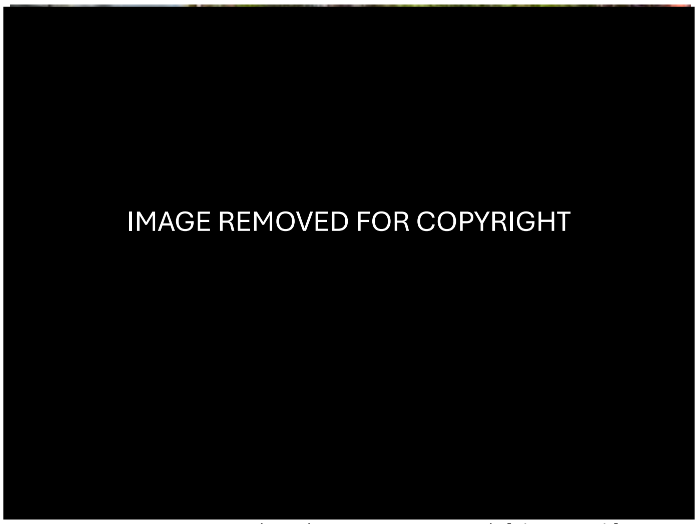


Figure 73: Time Out. (2022). Open Street in NYC), [Photograph].

Tactical urbanism also values flexibility, both spatially and temporally. Designs are not fixed, allowing for iterative adjustments and experimentation. This adaptability ensures that ideas can be tested and refined before permanent implementation (Carmichael et al., 2020).
When government regulations act as barriers to community-led initiatives, these trial periods identify challenges and kickstart awareness and advocacy efforts to negotiate policy changes that enable the implementation of local projects (Carmichael et al., 2020).

The strategies of tactical urbanism provide relatively quick and innovative ways to enrich cities and suburbs quickly and temporarily without permanently altering urban infrastructure (La Pinta, 2024). However, as Weir (2019) cautions, tactical urbanism should not be seen as a complete long-term solution to urban problems. *"Instead, tactical urbanism should be treated as a provisional catalyst for these more permanent ends."*

Part Two:

7. Design Methodology

This project follows a research-led design methodology that uses analytical, spatial, and design-based tools to develop a framework for integrating transport infrastructure and interventions within Auckland's urban environment. The process is structured to ensure that design decisions are grounded in the realities of movement, context, and place, recognising what *Gifford (2012)* describes as *"the mutual relations between people and their physical environments at the individual and small-group level."*

The methodology includes:

-Literature and precedent review to understand the relationship between transport systems, urban form, and regenerative design, drawing from examples of transit-oriented development and active mobility networks.

-Spatial and transport analysis, including accessibility studies, network mapping, population and land-use change analysis, to identify where transport and ecological interventions can most effectively support connected and resilient neighbourhoods.

-Multi-scalar site analysis, assessing ecological layers, cultural context, infrastructure conditions, and urban morphology to inform place-responsive design strategies.

-Urban mapping techniques, such as catchment mapping and street hierarchy studies, to visualise mobility challenges and opportunities within the network.

-Iterative design testing, using, diagrams, and digital modelling to explore how transport infrastructure can be re-integrated into Auckland's built environment at neighbourhood scales.

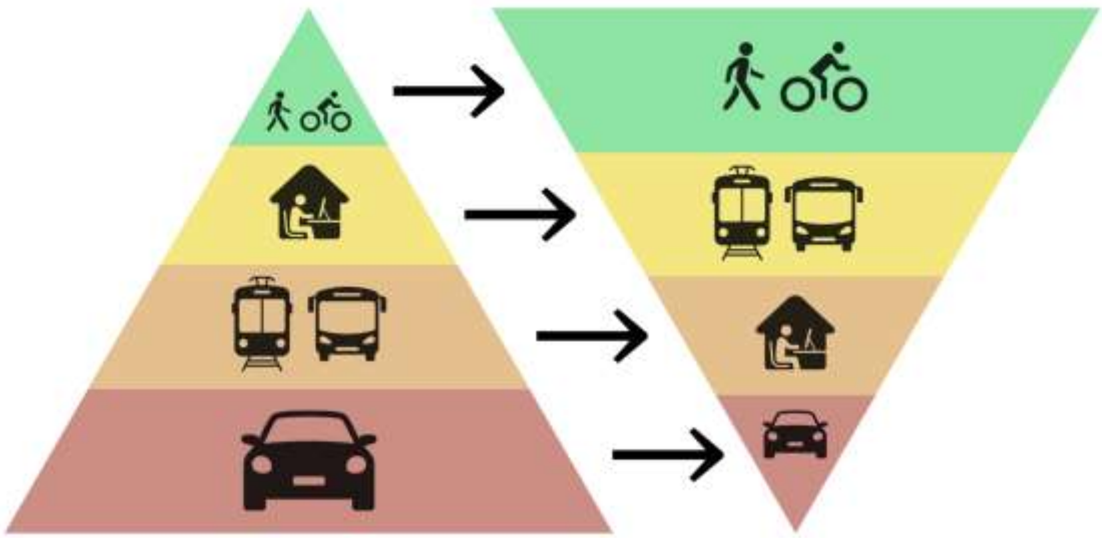


Figure 72: Evolving Travel Behaviour - Current vs Potential Preference.

8. Site Selection and analysis

8.1 Purpose of Site Selection

To explore how neighbourhoods can adapt to future transport technologies, this thesis tests these ideas within a selected neighbourhood in Auckland. The site selection process focused on identifying a location at a neighbourhood scale, large enough to encompass a full walkable catchment rather than a small cluster of streets. Working at this scale allows the design proposition to demonstrate how alternative transport choices could be introduced and how associated patterns of urban change may emerge.

Sites were shortlisted based on two criteria: proximity to the city centre, and the absence of existing rapid transit connections *(Figure 74)*. Using this criteria, five potential locations were identified in Glenfield, Ponsonby, Mt Eden, Balmoral, and Mangere *(Figure 75)*.

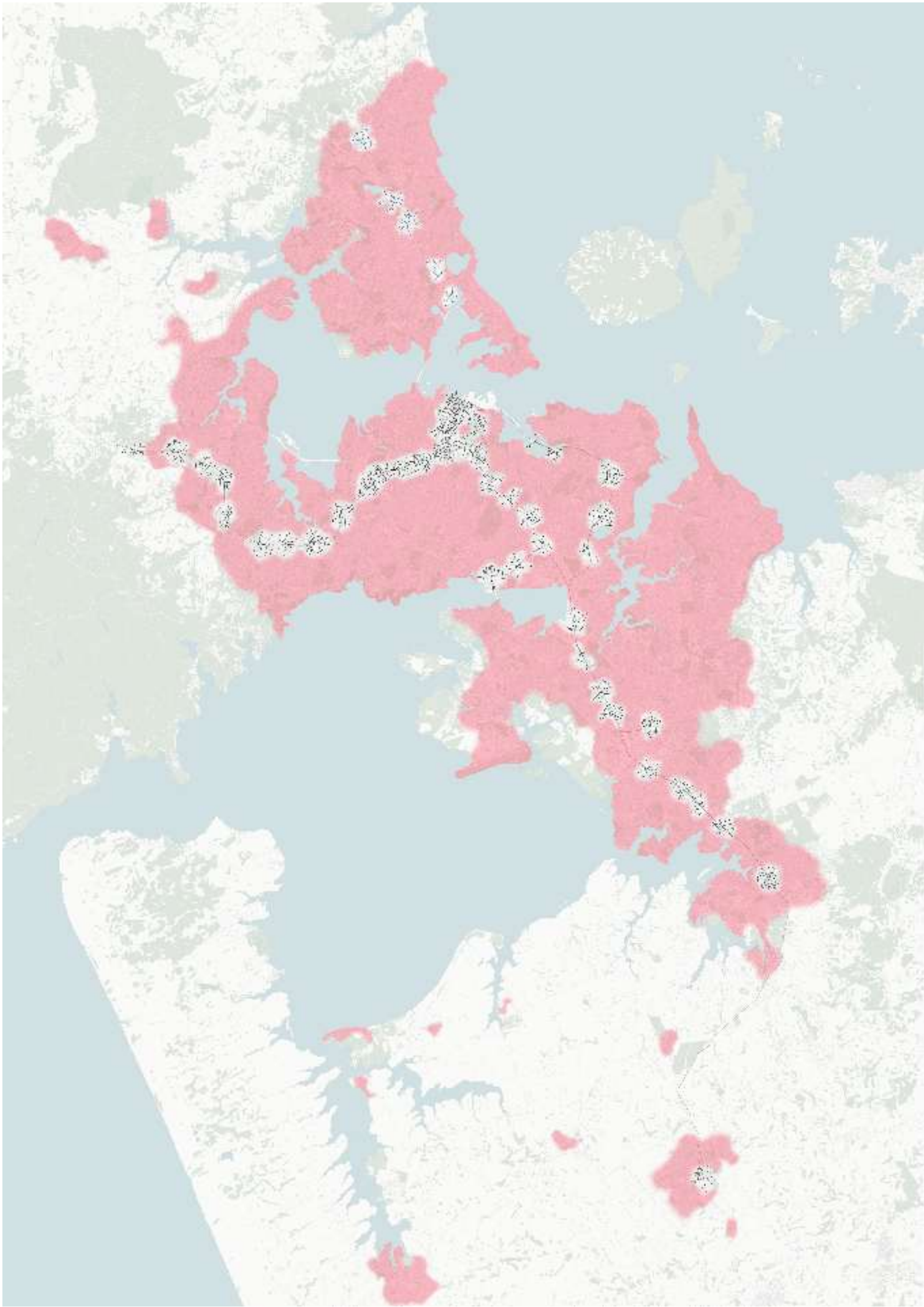


Figure 74: Rapid transit walkable catchments showing areas within walking distance of stations and gaps not currently served.

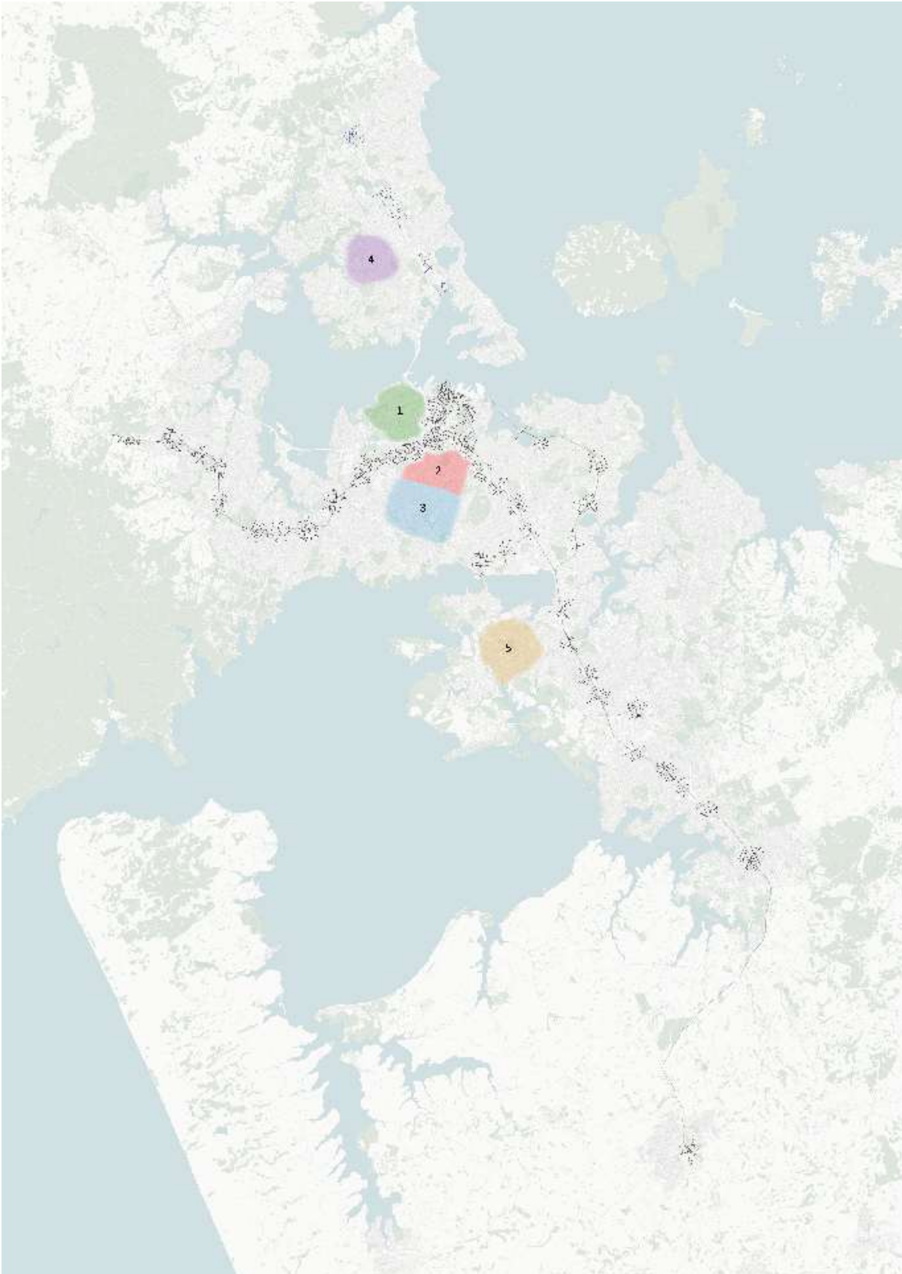


Figure 75: Five potential sites

Balmoral was selected as the most suitable option. The area has close links to the city centre, and strong potential for urban intensification along the existing frequent bus corridors highlighted in Plan Change 120. The neighbourhood also contains local town centres along its surrounding arterial roads, which support local businesses and provide focal points for community activity. It also sits within the broader planning context of future light rail or metro rail proposals.

The study area was further refined to a specific block bordered by Sandringham Road, Dominion Road, and Balmoral Road. This block is not directly connected to the rail network, with the nearest stations at Morningside and Kingsland, both approximately 1.5 kilometres from its northern edge. However, it is framed by three high frequency bus routes, the 24, 25, and 65 *(Figure 76)*, which operate along the surrounding arterials. This combination of limited rapid transit access and strong bus-based connectivity creates a context where future transport technologies and design interventions can be meaningfully tested at the neighbourhood scale.

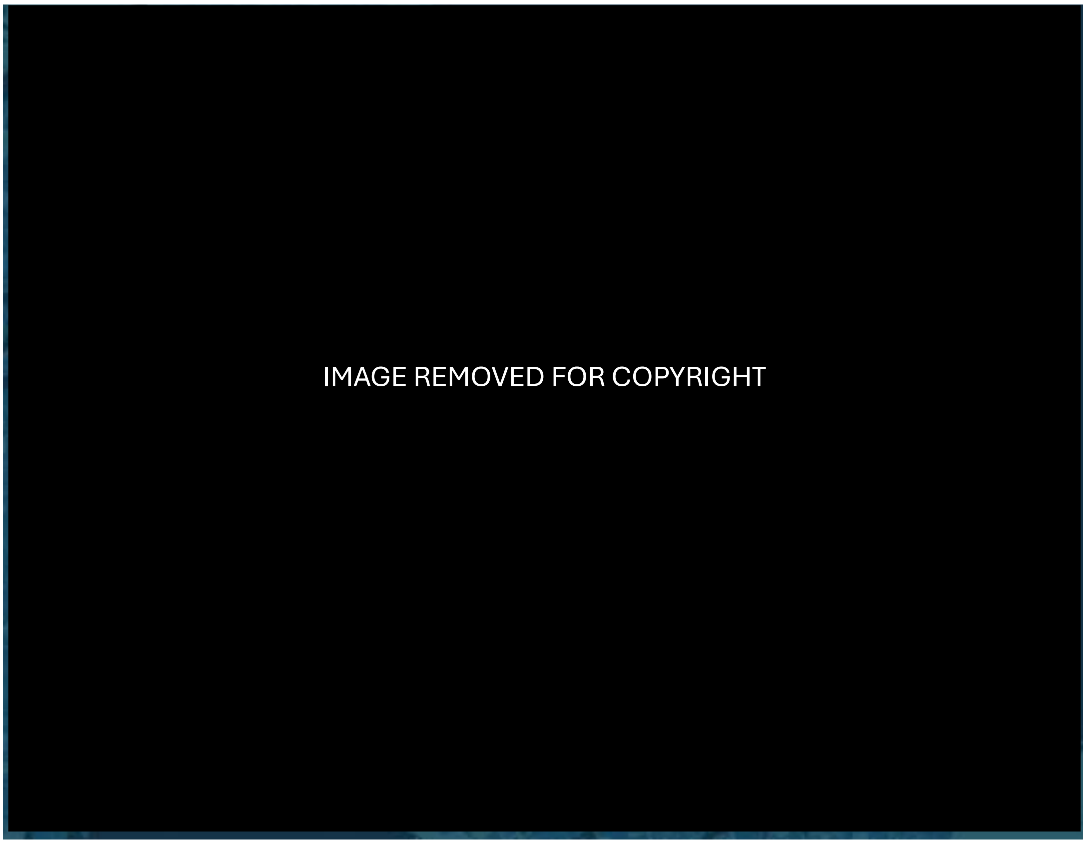


Figure 76: Upzoning the Frequent Transit Network [@ScootFoundation]. (2025, September 29) Author: Scott Caldwell

Figure 77: Selected Site

9. Balmoral Site Context

9.1 Site History

Extensive swampland once existed around Balmoral and Sandringham, where freshwater flowed into underground caverns. The surrounding resources were traditionally used by Māori *(Auckland City Council, 2011).* The Sandringham area was described as desolate, strewn with boulders and flooded in parts almost all year round from Eden Park to the present Sandringham shopping centre. *(Auckland City Council, 2011.)*

This urban block was developed throughout the 1920s with the electric tramway *"extended to Halston Road in 1920" Auckland City Council, 2011.* And further south throughout the decade. *(Auckland City Council, 2011.)*
Throughout the 1920s to 1950s the shops catered for most of the everyday needs of surrounding residents and included butchers, bakers, fruiterers, drapers, dairies, fishmongers, chemists and stationers. *(Auckland City Council, 2011.)*

IMAGE REMOVED FOR COPYRIGHT

Figure 78: (Luke.xensen, 2019) The growth and decline of Auckland's electric tramway network from 1900 to 1960. [Map]

Figure 79: View down Sandringham Road towards the Sandringham shopping centre, November 1923
Auckland City Libraries Special Collections 4-5286

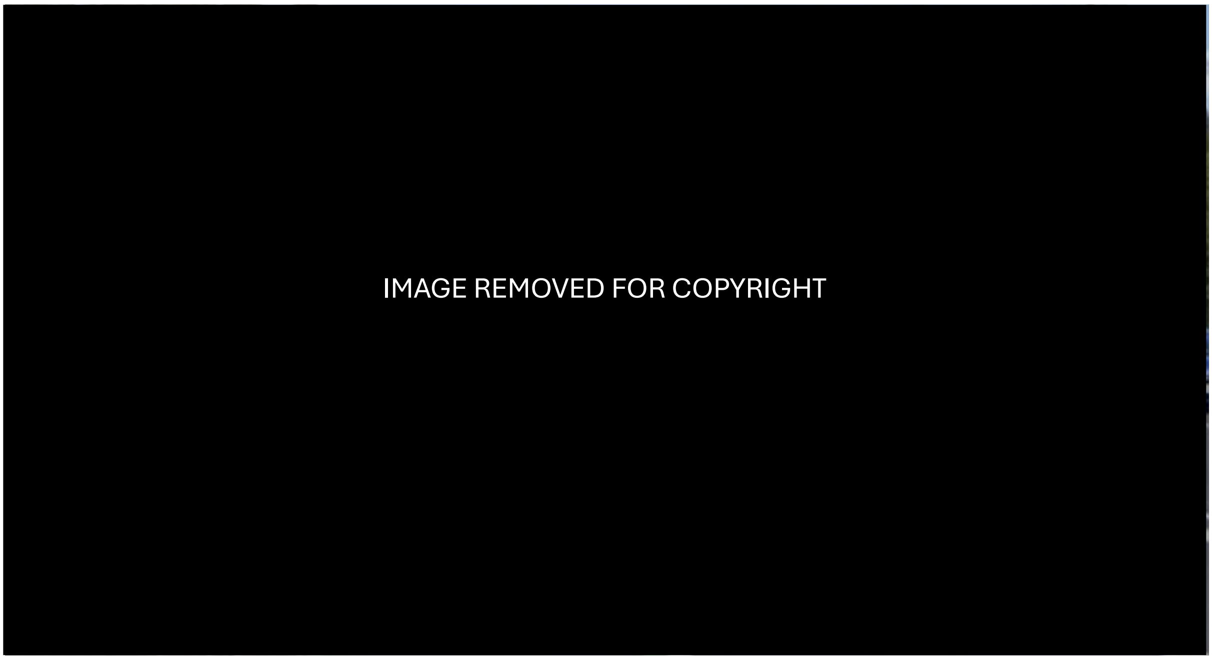


Figure 80: View down Sandringham Road towards the Sandringham shopping centre, March 2021
SOURCE: Google Maps, Street View image, Retrieved October 30, 2025

Balmoral Site - 1912

Figure 81: (Winkelmann, 1912) Mount Eden, Mount Hobson and Mount St John from Mount Albert, 1912
Auckland Libraries Heritage Collections 1-W1494-PAN

Balmoral Site - 1926

Figure 82: (Winkelmann, 1926) Auckland from Mount Albert, 1926
Auckland Libraries Heritage Collections 1-W0740

Balmoral Site -1930

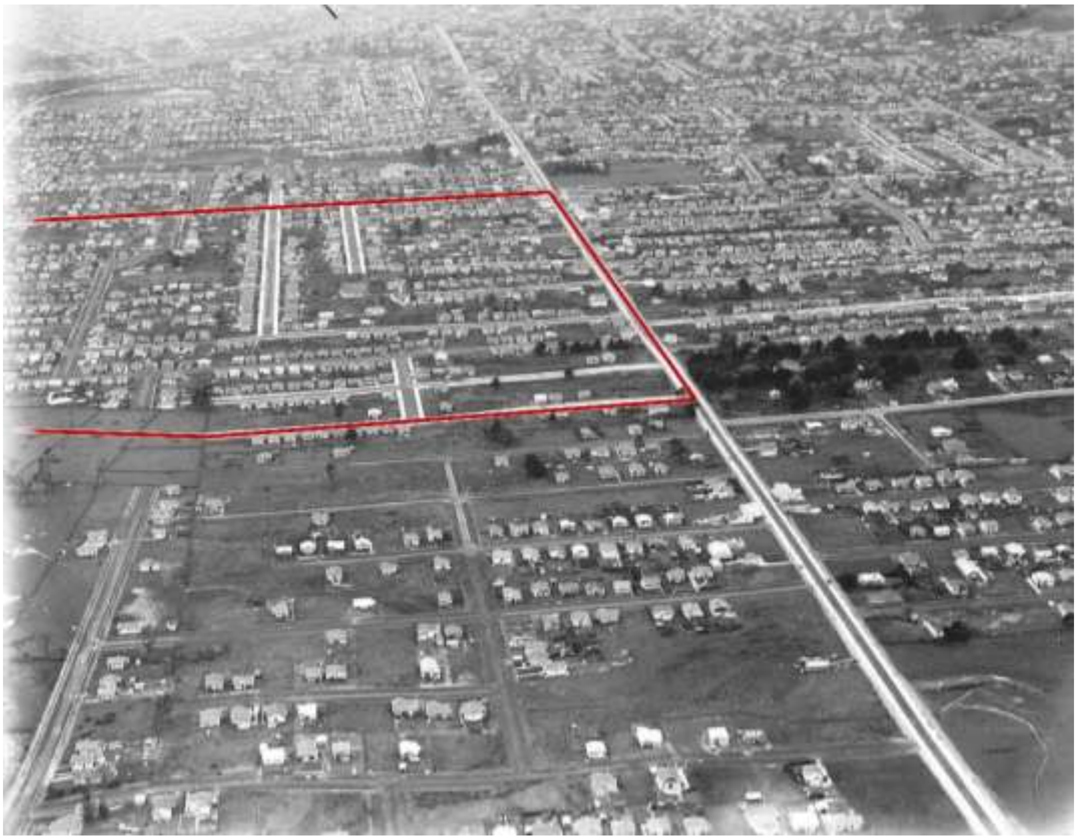


Figure 83: (Douglas, 1930) Balmoral from the air
Auckland Libraries Heritage Collections FDM-0481-G
(Site boundary added)

The tram tracks were removed in 1954 and around the same time a town planning requirement meant that any new buildings were set back seven feet further from the road. *(Auckland City Council, 2011.)*

9.2 Existing Conditions

The street network within the Balmoral block follows a conventional rectilinear grid, providing a clear and legible layout, with direct East-West connections to the main arterial roads. However, some aspects of the grid were never connected resulting in cul-de-sacs and parts of the neighbourhood less connected with more arduous routes of travel.

The block allows for almost complete coverage within a ten-minute walk (approximately 800 metres) from its centre *(Figure 84)*. From this point, pedestrians can easily access both sides of the block, including the town centre and local shops along Sandringham Road and Dominion Road. This catchment area expands considerably when considering a ten-minute bike ride (approximately 3 kilometres), connecting residents to three nearby railway stations: Baldwin Avenue, Morningside, and Kingsland. *(Figure 84)*

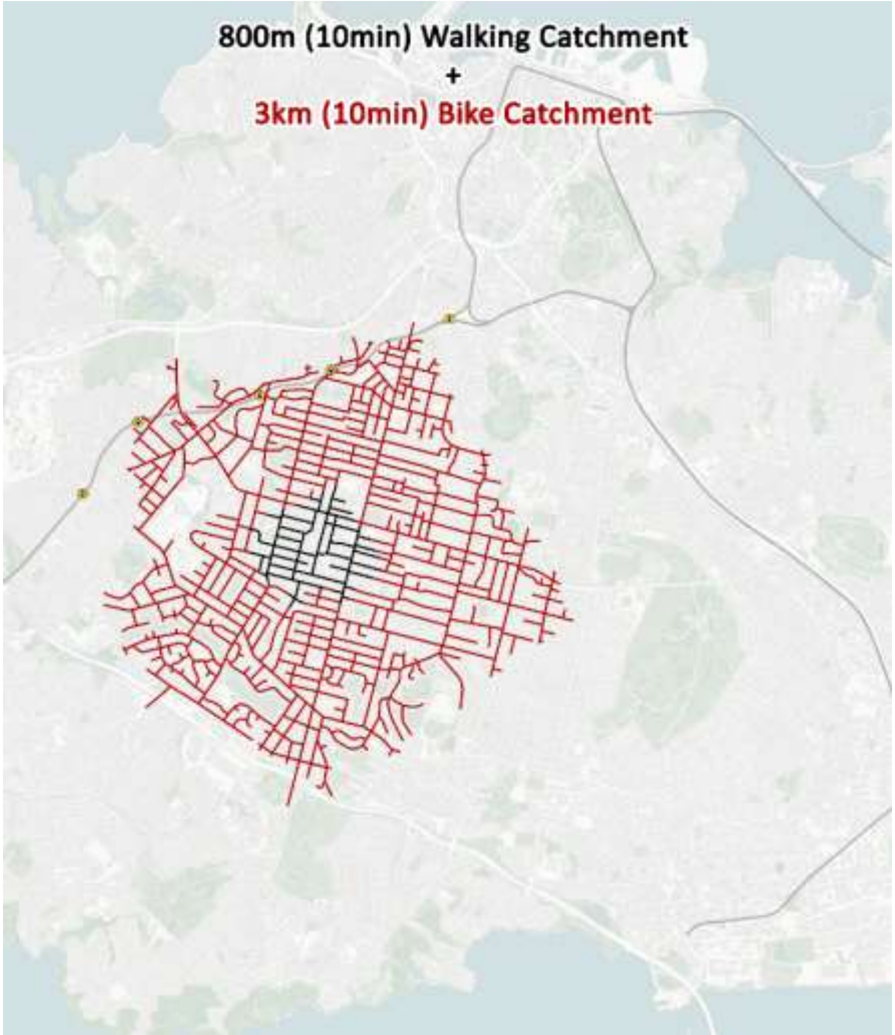


Figure 84: Walkable 10-minute (800m) and bikeable 10-minute (3km) catchment

The residential housing stock is predominantly composed of villas, transitional villas, and bungalows *(Auckland Unitary Plan Independent Hearings Panel, 2015).* The earliest villas and transitional villas are clustered at the northern end of the area, particularly near the intersection of Balmoral and Dominion Roads, which was the tram terminus pre-World War I. The southern half of the block features a high concentration of bungalows, corresponding with the extension of tram lines along Sandringham Road in 1925 and Dominion Road in 1930 *(Auckland Unitary Plan Independent Hearings Panel, 2015).*


Figure 85: Balmoral Building typology Collage

The streets are lined with mature trees, wide footpaths and large grass berms. Road corridors are relatively narrow, between 6-12 metres wide, and houses are positioned close to the street boundary *(Auckland Unitary Plan Independent Hearings Panel, 2015).* While the block is surrounded by several parks, there is no dedicated public green space located within the block itself.

Many of the properties in the area include street-facing garages and sheds. These structures were typically added later, as most of the original houses were built before widespread car ownership and were not designed with on-site vehicle storage in mind. Their orientation toward the street, however, creates the potential for them to evolve into integrated local businesses at the scale of individual streets and blocks. This opportunity is strengthened by the growing number of people working from home, which represents 19.55% of the local population *Stats NZ. (2023–2024).* Suggesting potential demand, for community-focused businesses to emerge directly from residential properties. *(Figure 86, 87)*

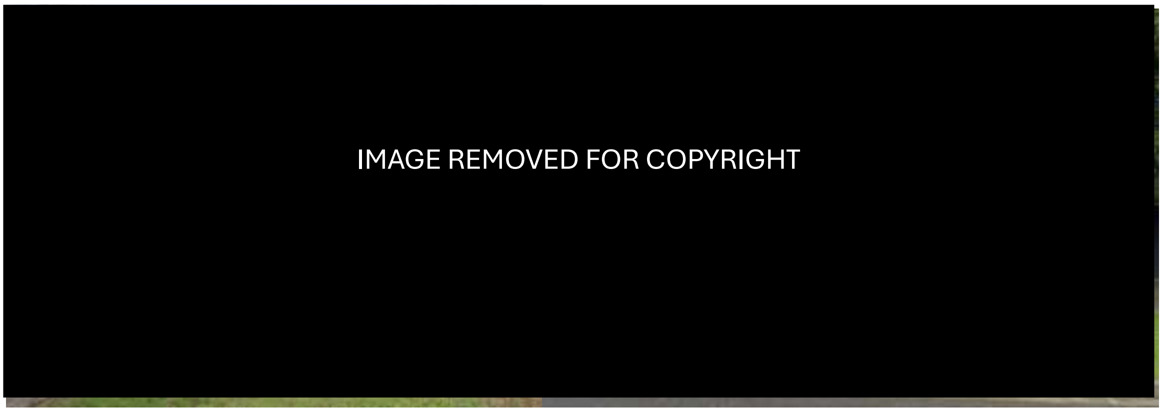


Figure 86: Street facing garage 1

Figure 87: Street facing garage 2

There are already strong signs of community interest and informal intervention across the block. During a site visit, many streets featured self-assembled play spaces for children, likely a response to the limited availability of nearby parks. Residents had made creative use of berms and mature trees by installing swings, climbing frames, tables and small gardens. These observations suggest that, with fewer restrictions on how berms can be used, there is considerable potential for resident-led and self-maintained interventions. *(Figure 88, 89)*.

Figure 88: Existing Interventions 1

Figure 89: Existing Interventions 2

9.3 Social Context

The demographic and travel data for Balmoral offers important insight into the neighbourhood's current mobility patterns and its capacity to transition toward more sustainable transport modes. The site covers the statistical areas of Balmoral and Sandringham East. By combining the available data from both areas and calculating averages where appropriate, the following demographic breakdown is produced:

Population	6,840
Median age	35
Number of Houses	2,370
Average household	2.9 People
Number of businesses	975
Median Wage	47,650

Stats NZ. (2023–2024). Place and ethnic group summaries: Sandringham East (SA2).

Main means of travel to work

Transit Mode	**Modal Share %**
Drive a private car, truck or van	47.25
Work at home	19.55
Public bus	14.2
Drive a company car, truck or van	6.75
Walk or jog	4.15
Bicycle	3
Passenger in a car, truck, van or company bus	2.7
Train	0.45

Stats NZ. (2023–2024). Place and ethnic group summaries: Sandringham East (SA2).

While 47.25% of residents commute by private car, this figure sits below the Auckland average of 55% (Stats NZ. 2023), suggesting the community is already somewhat less car-dependent and more receptive to alternative transport options. Public bus use accounts for 14.2% of work trips, compared to 5.7% across the region *(Stats NZ. 2023).* Reflecting the strong role of the existing frequent bus corridors running along the surrounding arterials.

The relatively high proportion of residents working from home at 19.55% (Stats NZ. 2023), indicates shifting travel behaviours and reduced pressure on peak-hour congestion. It also represents a demographic group that could benefit from, and be responsive to, improvements in local mobility and neighbourhood-level transport options. Active modes remain low overall, with walking at 4.15% and cycling at 3%, yet this is again above the regional average of 3.3% and 0.9% respectively *(Stats NZ. 2023).* This highlights an opportunity for targeted interventions that improve safety, connectivity, and street quality within the neighbourhood.

Together, these statistics demonstrate that while private vehicle use still dominates, there is a foundation of public transport use and shifting travel behaviour.

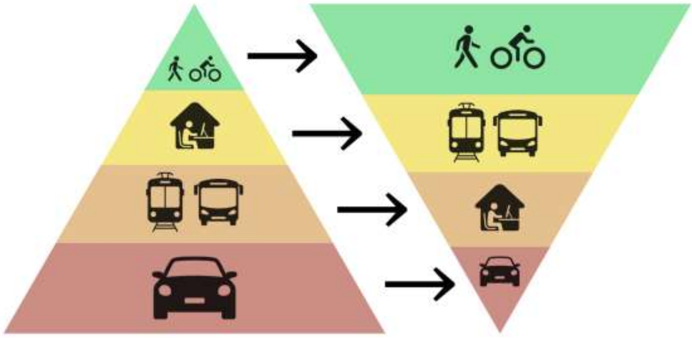


Figure 90: Evolving Travel Behaviour - Current vs Potential Preference.

9.4 Ecological Overlays

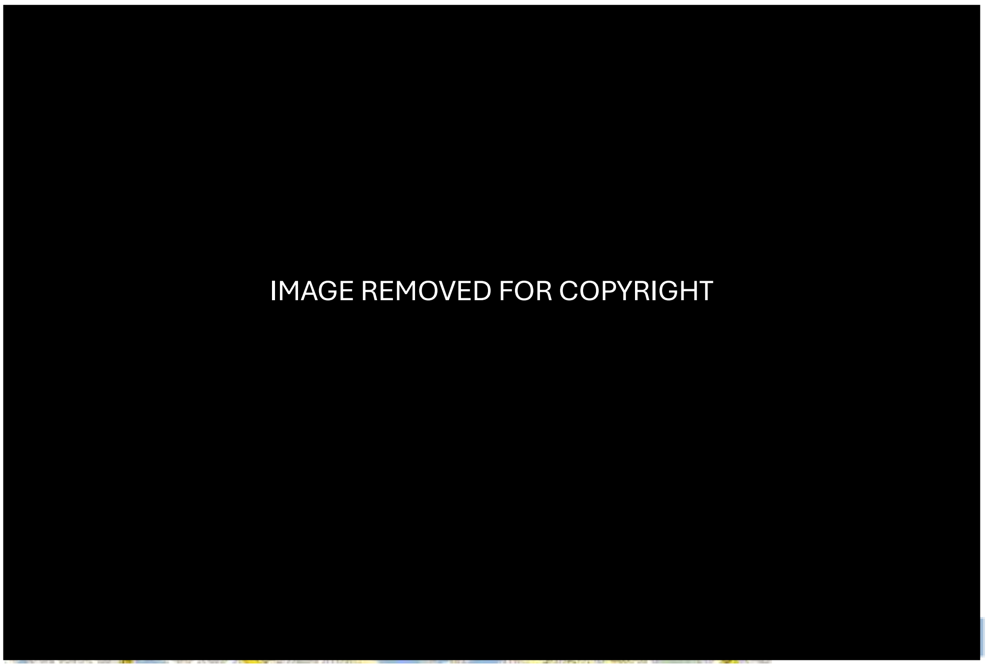


Figure 91: Flood Plains within The Balmoral Site and surrounding suburbs

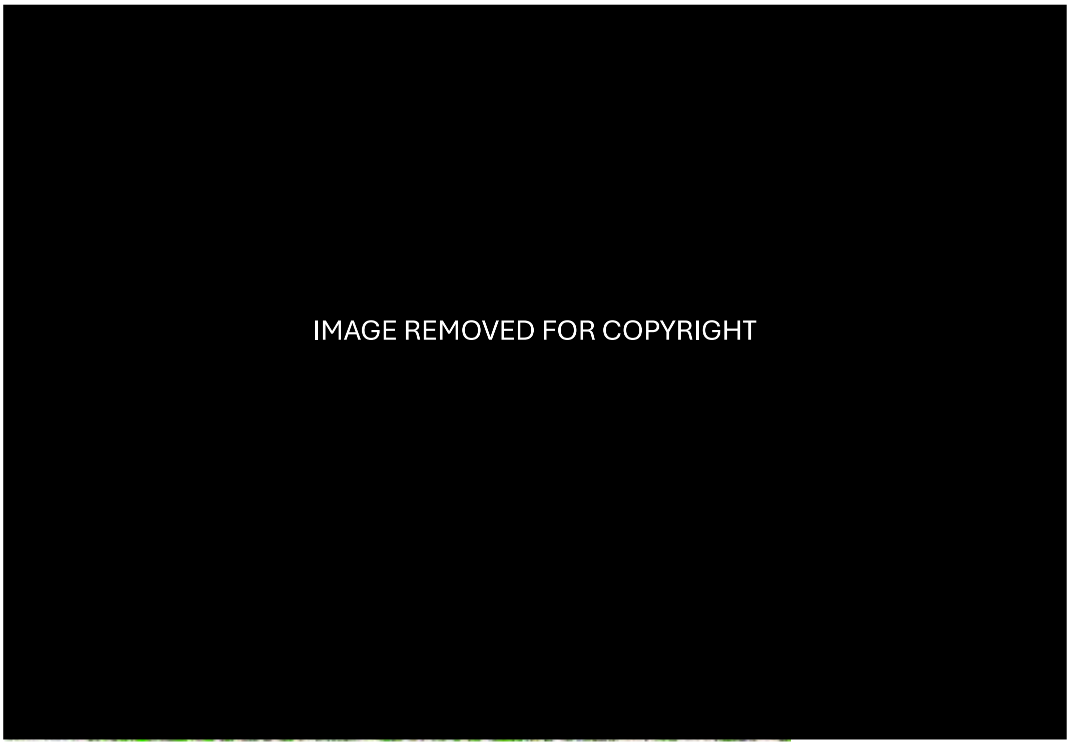


Figure 92: Green vegetated cover across the Balmoral site block

9.5 Opportunities and Constraints

Recent proposed changes to the Unitary Plan through Draft Plan Change 120: Housing Intensification and Resilience, have retained a similar level of the current density within the site due to heritage overlays and flood risk. However, the frequent transit routes that run around the perimeter of the site now allow for increased density along these corridors. This occurs through the Frequent Transit Network corridor intensification area (blue outline) and Policy 3d, which enables upzoning around Centre Zones (brown outline).

Figure 93: Existing Unitary Plan - H Zones - Residential

IMAGE REMOVED FOR COPYRIGHT

Figure 94: Draft Proposed Plan Change 120 - Housing Intensification and Resilience Local Board - Albert - Eden

The new zoning overlay allows for increased density along frequent transit corridors and around town centre zones *(Figure 70)*. In theory, these outlines create a neighbourhood scale perimeter block structure. In practice, however, heritage overlays and flood prone areas, significantly limit the extent of sites that can be upzoned to 20 metres (six storeys). This level of density only applies to land zoned as Residential: Terrace Housing and Apartment Buildings (orange) that also sits within the frequent transit corridor and town centre zones.

IMAGE REMOVED FOR COPYRIGHT

Figure 95: (left) Existing Unitary Plan – Heritage Overlay
Figure 96: (right) Existing density

As a result, the proposed six storey density for the Balmoral site applies only to the areas highlighted in figure 97 and 98.

Figure 97: Proposed density
Figure 98: Proposed CAD

Plan Change 120 also demonstrates a potential future direction. Land within the walkable catchment of Kingsland Station, a rapid transit stop on the Western Rail Line, has already had most heritage overlays removed around Eden Park, in preparation for the City Rail Link. This has allowed the upzoning of Terrace Housing and Apartment Buildings land to 50 metres, or about fifteen storeys *(Figure 99, 100)*. Given that the central isthmus has been repeatedly identified in past, future and current transport studies as an important rapid transit corridor, it is reasonable to assume that heritage overlays in this area could also be reduced or removed.

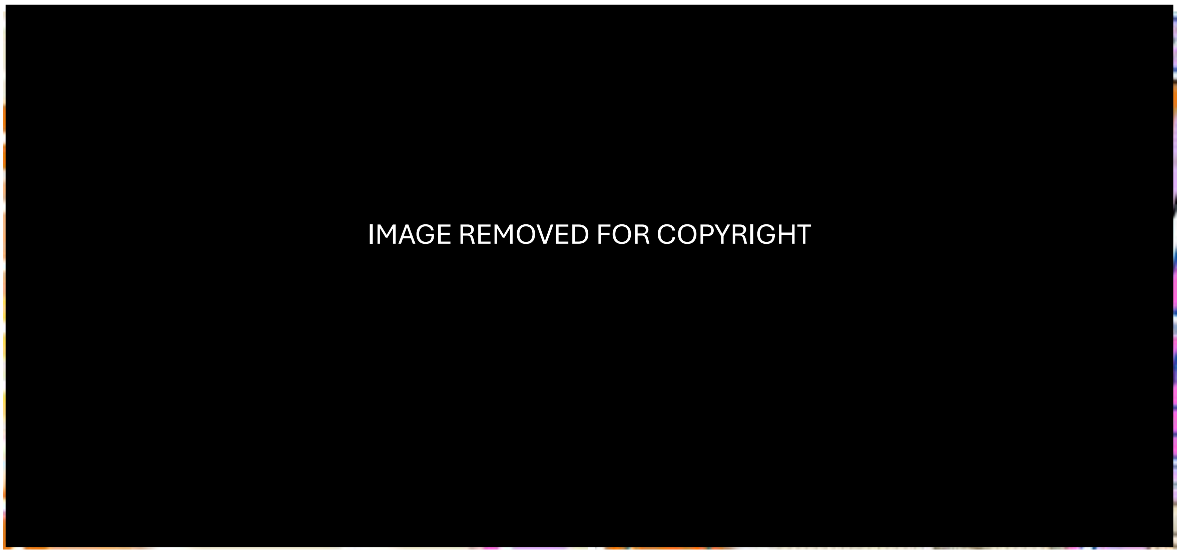


Figure 99: (left) Eden Park - Existing Unitary Plan   Figure 100: (right) Eden Park - Plan Change 120

For the purposes of long-term planning, Dominion Road and Sandringham Road are expected to support rapid transit routes, most realistically in the form of surface light rail or tramway given construction cost and corridor constraints. With rapid transit routes on either side of the site boundary, it is reasonable to assume that heritage overlays within the walkable catchment would be reduced, allowing higher density development of at least six storeys.

Flood mitigation is another key consideration within Plan Change 120. Much of the land that was upzoned was intended to offset the large areas that were either downzoned or retained at a lower density. However, mapping of local flood risk clearly shows that a significant proportion of the upzoned land lies within flood prone zones *(Figure 101)*.

Figure 101: Flood prone areas within site

To address this, potential upzoning locations can be amended to align more closely with future rapid transit routes and to prioritise land with little or no flood risk. Conversely, areas within Plan Change 120 that face high flood risk should be downzoned to support long term resilience and safety.

The outcomes of such an amendment are as follows *(Figure 102, 103)*.
Higher density zoning is concentrated around existing frequent transit corridors and future rapid transit corridors to enhance accessibility to public transport and town centres. Upzoning is directed towards land with minimal or no flood risk, particularly around the perimeter and centre of the block, establishing a neighbourhood scale perimeter block structure. This arrangement places residents in close proximity to transit options while creating a green outlook towards the interior of the neighbourhood, forming a semi enclosed public space that supports social activity, ecological function. A more realistic massing of the proposed density can be viewed in *(Figure 105, 106)*.

Figure 102: Flood prone areas within site + Zoning Amendment
Figure 103: Flood prone areas within site + Zoning Amendment CAD

Figure 105: Zoning Amendment CAD realistic

Figure 106: Zoning Amendment CAD realistic iso

Areas within the remaining low density heritage zones and flood prone areas can be prioritised for public green and blue spaces and ecological regeneration. This approach supports the creation of inviting places for people to gather and interact. These spaces establish a localised public realm that feels semi enclosed and separate from the busy roads and surrounding town centres, while remaining open and accessible to both residents and visitors. This can be enabled through the repurposing of sections of street space and the strategic acquisition of high-risk private land for conversion into ecological regeneration areas.

If we view the flood risk zones as ecologically beneficial green space, we get a better sense of the scale of the potential public realm, through a connected ecological corridor *(Figure 104)* with green outlook from residents *(Figure 107)*. While still retaining some of the heritage homes.

Figure 104: Flood Plain vegetation overlay

Figure 107: Green corridors within the site

With the aim of shifting residents towards more sustainable and space efficient modes of transport, and to accommodate the increase in foot traffic that accompanies higher density living, a long term traffic management approach is proposed *(Figure 108)*.

A potential strategy involves limiting vehicular through traffic to two north-south corridors within the block, both of which connect to an outer east-west link. This would reduce rat running through the neighbourhood, minimise conflict points between vehicles and pedestrians, and decrease the number of merging intersections along the transit arterials of Sandringham Road and Dominion Road. Separating these two corridors ensures that car travel is prioritised for longer distance journeys beyond the block, rather than short internal trips.

East-west streets are primarily repurposed as traffic calmed cul de sacs for vehicles, while remaining continuous routes for active travel. This layout provides direct access to individual properties from the main north-south corridor but discourages unnecessary vehicle movements, ensuring that drivers use these streets only when they live in or are visiting the area.

Figure 108: Traffic management plan

To support this plan, three new connections are required to complete the fragmented aspects of the street grid. These include one new road corridor to accommodate north south vehicle movement, and two new active travel links that strengthen east west pedestrian and cycle access. Similar approaches have already been implemented in New Zealand, including the Hamilton Road cycleway in Cambridge, Waikato *(Figure 109, 110)*, and the Wairepo Swamp Walk in Kingsland *(Figure 111, 112)*, both of which demonstrate how targeted connections can significantly improve local mobility and reduce reliance on the wider road network.

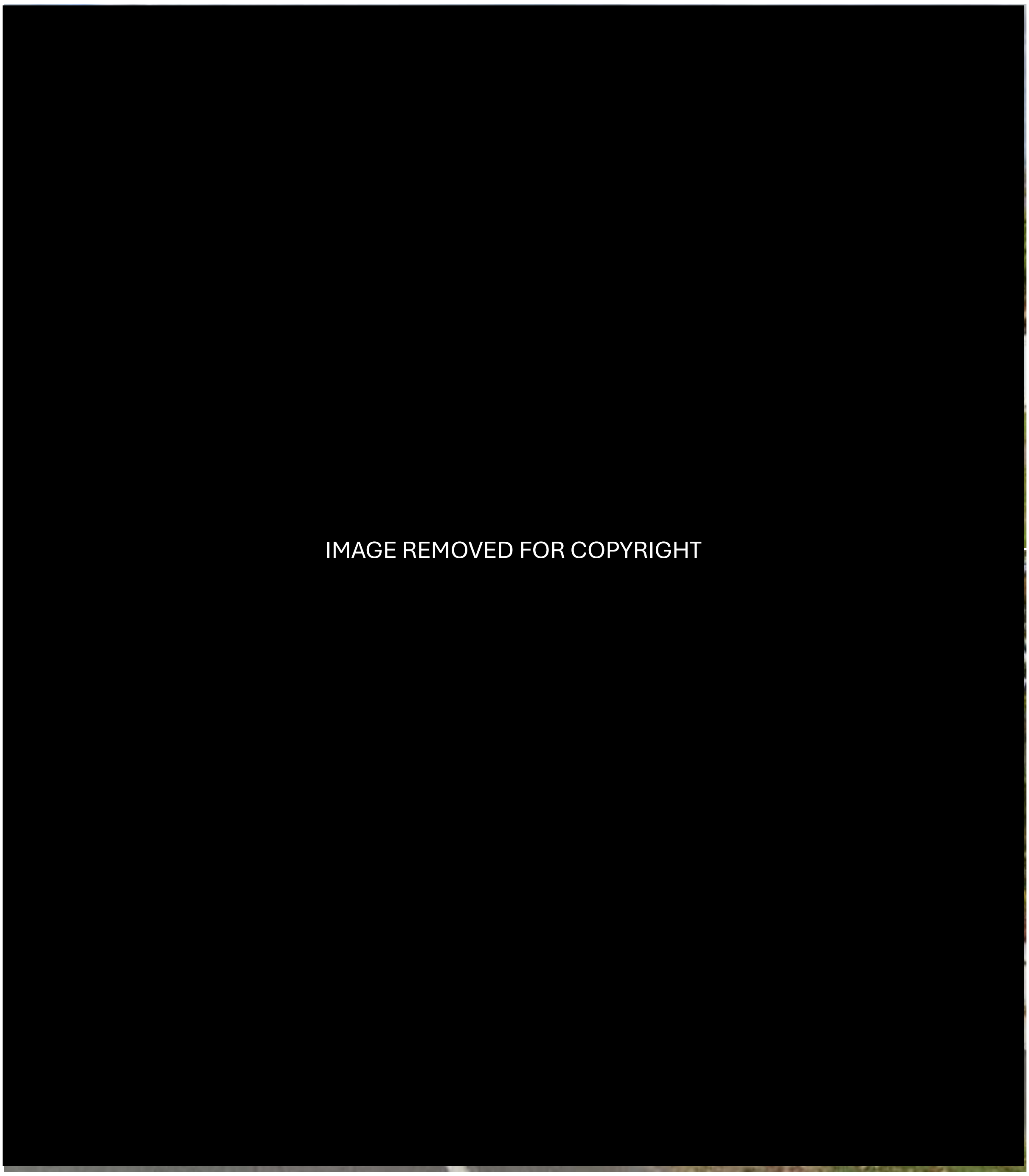


Figure 109: (2020)
Figure 110: (2025)
Example of vehicular cul-de-sacs open to active modes.
Hamilton Road Cambridge Waikato.

Highlighted new corridors are shown in Figure 113, and the structures required for removal are shown in Figure
114.

Figure 111: (2009)
Figure 112: (2012)
Example of new active travel link.
Wairepo Swamp walk Kingsland, Auckland.

Highlighted new corridors are shown in Figure 113, and the structures required for removal are shown in Figure 114.

Figure 113:
New corridors

Figure 114:
Properties required for removal

10. Design Strategies and Interventions

10.1 Temporary Timber interventions – Short Term

Timber tree boxes can act as protective buffers, preventing vehicles from entering certain areas, while also serving as nursery planters for young trees before they are moved into the ground.

Timber garden boxes provide opportunities for local and communal food growing, as well as dedicated planting space for vegetation that supports long term neighbourhood greening and community activity.

Figure 115: Temporary – Timber tree planter

Figure 116: Temporary – Timber communal agricultural garden

Timber stalls or stands provide interactive elements that encourage engagement and activity between neighbours. These multipurpose structures can be used by small businesses, charities, or local groups, and can also serve as spaces for community to feedback on current and planned proposals related to neighbourhood changes.

Community boards can be established across the site to educate and share updates on plans and progress for ongoing initiatives. They can also provide space for advertising community events and local businesses, or act as interactive canvases for residents and children to engage with.

Figure 117: Temporary – Timber stall/stand

Figure 118: Temporary – Timber community board

10.2 Temporary Concrete interventions Short – Medium Term

Concrete elements provide a stronger protective buffer between different streetscapes and create a greater sense of permanence. These would be suitable in situations where an initiative has community support but lacks the funding for full implementation. They signal that the idea is established and stable, while still awaiting investment in permanent infrastructure.

Figure 119: Temporary –Concrete planter pot

Figure 120: Temporary – Concrete blocks, barriers and rocks.

10.3 Examples of implementation across an average 10-metre-wide road corridor in Balmoral:

Figure 121: Temporary – Concrete blocks, Timber community board – In use

Figure 122: Temporary – Rocks, painted road space – In use

Figure 123: Temporary – Timber agricultural garden Timber tree planter

Figure 124: Temporary – Concrete planter pot and timber stall/stand

10.4 Example of implementation across an average 15-metre-wide street parking corridor in Sandringham Town Centre:

Figure 125: Temporary – Concrete planter pot and timber outdoor dining

10.5 Example of implementation for localised home-based business from street-facing garage:

Figure 126: Potential garage business.

10.6 Process of Street Transformation – Arabi St and Tranmere Rd:

Current Layout: Tranmere Rd is identified as strategic corridor for improved pedestrian space, while Arabi St is identified as a key vehicular corridor.

Figure 127: Current intersection Arabi St and Tranmere Rd

Phase 1: Tranmere Road is closed to the west using flexible posts. The main vehicle route is marked in red and curved slightly to encourage slower driving through the intersection.

Figure 128: Phase 1 intersection Arabi St and Tranmere Rd

Phase 2: Quick temporary interventions are installed, and public consultation is carried out with residents within the closed-off area to gather their ideas and aspirations for how the space could be used.

Figure 129: Phase 2 intersection Arabi St and Tranmere Rd

Phase 3: Community ideas are selected and implemented using temporary interventions, with resident feedback monitored so that adjustments can be made quickly.

Figure 130: Phase 3 intersection Arabi St and Tranmere Rd

Phase 4: After a preferred layout and use has been identified, the space is rebuilt with permanent infrastructure that best meets residents' needs. Trees and other vegetation previously used in planters are then planted directly into the ground.

Figure 131: Phase 4 intersection Arabi St and Tranmere Rd

Phase 5 (10+ years): The space becomes well established within the community, and the trees mature to form a larger canopy.

Figure 132: Phase 5 intersection Arabi St and Tranmere Rd

10.7 Main Vehicle Route - Temporary:

Figure 133: Street re-routing Temporary, view 1

Figure 134: Street re-routing Temporary, view 2

10.8 Main Vehicle Route - Permanent:

Figure 135: Street re-routing Permanent, view 1

Figure: 136: Street re-routing Permanent, view 2

10.9 Rapid Transit corridor Sandringham/Dominion Road:

Frequent Bus corridor: The frequent bus route operates with dedicated 24/7 priority lanes and traffic camera enforcement, supporting the movement of up to 1,200 people per hour in each direction.

Figure 137: Temporary Rapid bus solution

Rapid Tram / Light Rail corridor: Rapid Tram or Light Rail operates in the centre of the arterial road within a dedicated corridor, enabling higher speeds and supporting the movement of up to 5,400 people per hour in each direction.

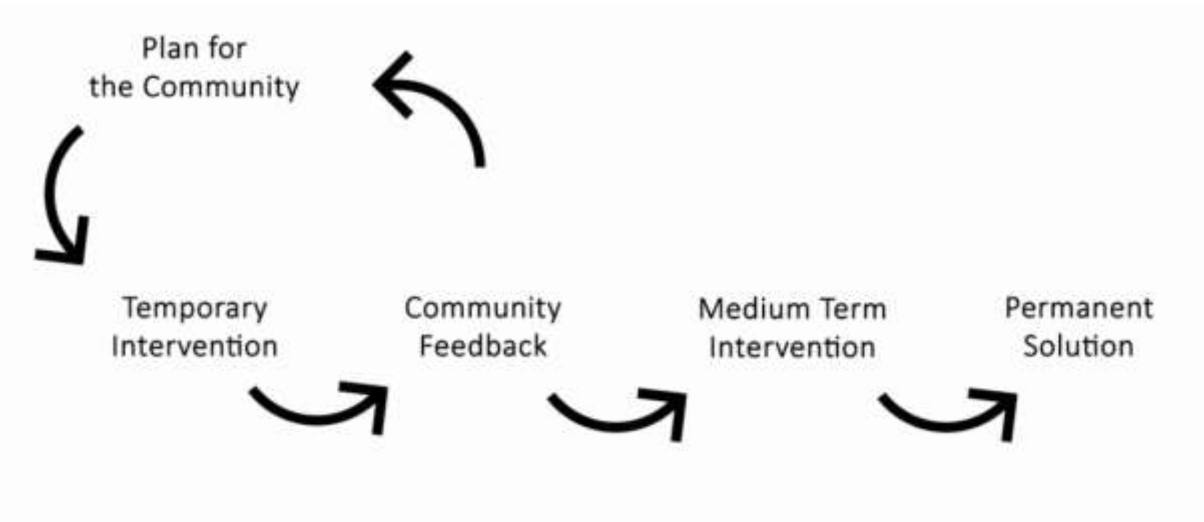
Figure 138: Permanent Rapid tramway

Conclusion:

This research has examined how past and present transport systems have shaped Auckland's urban form, and how future transport technologies and design strategies can guide a shift towards more connected, resilient neighbourhoods that prioritise people. The historical analysis demonstrated that each dominant transport mode of the time, whether walking, rail, trams, or later the private car, has significantly influenced the structure and functioning of the city and the form of individual neighbourhoods. The design investigation builds on these learnings, proposing a future in which transport infrastructure not only moves people efficiently but also restructures suburban environments to support community engagement and equal travel opportunities.

The proposed interventions for the redesign of the Balmoral neighbourhood show how streets can be reimagined as multifunctional public spaces that align with both Transit Oriented Development along the arterial corridors and Greenspace Oriented Development within the neighbourhood interior. By reshaping the movement network, restructuring modal priorities, and integrating ecological systems into the public realm, the project demonstrates a pathway for suburban areas to transition towards sustainable mobility while maintaining liveability and character. The approach offers clear advantages, including improved safety, reduced vehicle conflict, stronger local centres, expanded green networks, and greater resilience to climate impacts. At the same time, challenges remain, particularly the complexities of balancing heritage considerations, addressing flood prone land, and ensuring that new mobility options genuinely meet community needs.

The success of projects of this scale depends on meaningful collaboration with local communities and stakeholders. While this thesis proposes a design framework that can be broadly applied based on available demographic, spatial, and environmental data, a real-world implementation would require co design processes that draw on local knowledge and lived experience. Community involvement would be essential in determining how streets function, how public spaces are used, and how changes are phased over time.



Future research could extend this work in several ways. A detailed assessment of community responses to tactical and temporary interventions would help refine strategies for implementing gradual change. Further spatial modelling could also test how different transport futures, including surface light rail, bus rapid transit, or emerging mobility technologies, might reshape land use patterns and accessibility across the central isthmus.

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