Architectural Interventions in Transit:

Redesigning Suburban Streets With Intermodal Hubs Through Integrated Mobility Networks

JAPINDER SINGH BADWAL
MArch(prof) Thesis
2025

How Might Adding Intermodal Mobility Hubs Change How Neighbourhoods Are Designed?

How could the combination of an intermodal hub and neighbourhood streets be designed together as part of a broader integrated transport strategy?

How can architectural design generate and advocate for alternative spatial outcomes within transport design?

How could suburban streets be redesigned with the help of an improved transport network system?

What design considerations can improve the accessibility and efficiency of intermodal transport hubs?

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Abstract

This research explores the role of architectural interventions in transit systems to enhance suburban connectivity and urban mobility by integrating intermodal transport hubs. The study addresses disconnected suburban neighbourhoods by examining how the co-design of intermodal hubs and neighbourhood streets can contribute to a more integrated transport strategy. The research is guided by the question: How might adding intermodal mobility hubs change how neighbourhoods are designed?

The study employs a practice-based research approach, incorporating literature reviews, case studies, and design prototyping to investigate this. The research integrates transport-oriented development (TOD), the 15-Minute City, and high-density corridors to propose a design framework that prioritises pedestrian-friendly spaces, sustainable mobility, and mixed-use developments.

Findings indicate that redesigning suburban streets with transport hubs can enhance accessibility, reduce reliance on private vehicles, and promote sustainable urban growth. This study provides a scalable urban design model that can be adapted to other suburban contexts by implementing high-density development along key transport routes. The research contributes to the ongoing discourse on sustainable urban planning by demonstrating how architectural design can reshape transport infrastructure to foster more connected, liveable, and resilient communities.

Postionality Statement

As a New Zealand-born Punjabi raised in Papatoetoe, with family roots in India, my personal experiences have profoundly influenced my research. My early interest in mobility, from cycling around the neighbourhood as a child to taking buses to high school and trains to university, exposed me to diverse public transport forms and highlighted the challenges those without access to reliable transit faced. This personal connection sparked my research interest in improving connectivity in Papatoetoe through architectural solutions.

Growing up, I strongly connected with nature, trees, and the natural world. Over time, I became increasingly aware that all these areas were affected by climate change. One issue that particularly struck me was the high carbon emissions from vehicles, especially during traffic congestion. While commuting to university, I often noticed cars idling on motorways, releasing harmful emissions. This experience fuelled my interest in promoting public transport as a sustainable alternative. It inspired me to explore ways to integrate it into better-connected, environmentally conscious urban designs and look into singular zoning areas of New Zealand.

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Attestation of Authorship

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 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.

JAPINDER SINGH BADWAL

Acknowledgements / Dedication

I want to dedicate this thesis to my grandma, who couldn't see this but always believed in me and encouraged me to become the best designer I could be.

I want to thank my family and friends, who assisted me with the research throughout the year and motivated me to produce my finest work.

I would also like to thank my co-supervisors, Nick Sargent and Dermott Mc-Meel, for their invaluable support and guidance.

Additionally, I would like to extend my thanks to the other supervisors and technicians who contributed during the exhibitions and presentations.

This study follows a structured approach: first, establishing a theoretical foundation (Part 1), then analysing case studies to identify best practices, and finally applying these insights to a site-specific design intervention in Papatoetoe (Part 2).

Introduction

Urban mobility is critical in shaping contemporary cities, influencing accessibility, sustainability, and quality of life. In suburban areas, particularly in Papatoetoe, transport infrastructure often struggles to provide seamless connectivity, resulting in increased car dependency, traffic congestion, and inefficient land use. This research explores how architectural interventions can enhance suburban mobility by integrating intermodal transport hubs with neighbourhood streets, fostering a more accessible and sustainable urban environment.

Auckland's suburban development follows a low-density, car-oriented model, which limits public transport efficiency and pedestrian accessibility. As cities grow, there is an urgent need to rethink transport infrastructure to support mixed-use, high-density, and pedestrian-friendly environments. The underutilisation of transport corridors in Papatoetoe presents an opportunity to introduce intermodal hubs—integrated spaces that link various transport modes, such as trains, buses, cycling, and walking, into a cohesive urban system.

The following research question guides this thesis:
How might the addition of intermodal mobility hubs change how neighbourhoods are designed?
To explore this, the study investigates the following sub-questions:

- How can an intermodal hub and neighbourhood streets be designed as part of a broader transport strategy?
- How can architectural design influence alternative spatial outcomes in transport systems?
- What design interventions can improve accessibility and efficiency in intermodal hubs?

The key objective of this research is to examine how intermodal transport hubs can enhance suburban connectivity, accessibility, density, and land use, leading to a more sustainable urban environment.

This study adopts a practice-based research methodology, integrating literature reviews, case studies, and design prototyping to develop site-specific interventions in Papatoetoe. The thesis is structured into two parts:

1. Part One: Research & Theory – Establishes the theoretical foundation, examining key transport design concepts, case studies, and precedent analysis to inform the design approach.
2. Part Two: Design Application – Applies the research insights to develop a design framework that reimagines suburban streets and intermodal hubs, creating a connected, pedestrian-friendly urban fabric.

This research contributes to the discourse on Transit-Oriented Development (TOD), the 15-Minute City, and high-density corridors, demonstrating how architecture can transform transport infrastructure. By integrating transport planning with urban design, this study proposes a scalable model that can be adapted to other suburban areas, offering insights for urban planners, policymakers, and architects.

By rethinking suburban transport networks and introducing intermodal hubs, this research seeks to create vibrant, accessible, and sustainable communities. The findings aim to bridge the gap between architecture and transport planning, fostering a future-ready urban environment prioritising people over cars.

Chapter One: Literature and Precedent Review

Urban transport infrastructure shapes neighbourhood connectivity, accessibility, and sustainability. As cities grow, integrating transport hubs, mixed-use developments, and walkable streets becomes essential in reducing car dependency, improving public transport efficiency, and enhancing the quality of urban life. This chapter reviews key theoretical frameworks and precedent studies that inform the architectural redesign of suburban streets and intermodal transport hubs in Papatoetoe.

This review examines the intersection of architecture, urban mobility, and transport planning, focusing on three core themes:

1. Key Transport Design Concepts – Exploring theories such as transit-oriented development (TOD), the 15-minute city, and chrono-urbanism, which emphasise walkability, mixed-use development, and transport efficiency.
2. Precedent Studies – Investigating site-specific and international case studies, including Southern Cross station (Melbourne), Kings Cross station (London), and the Rosslyn-Ballston corridor (Virginia, USA), to extract best practices for integrating transport hubs into suburban contexts.
3. Urban Scale Transformations – Reviewing suburban and city-scale interventions, such as São Paulo's master plan and Copenhagen's finger plan, to understand how large-scale transport strategies influence land use, density, and accessibility.

By synthesising literature and precedent studies, this chapter aims to identify design opportunities and challenges in transport-oriented suburban development. The findings from this review will establish the theoretical foundation for the design interventions proposed in later chapters, ensuring that the research is grounded in evidence-based strategies for sustainable urban mobility.

The insights from this literature and precedent review will guide the conceptual and spatial framework for designing an intermodal hub and suburban street network in Papatoetoe. By learning from past projects and theoretical models, this research aims to propose a scalable, future-ready transport solution that enhances urban connectivity and accessibility.

Key Transport Design Concepts

15-Minute Cities/Chrono Urbanism

The concept behind the 15-minute city is that every resident can access essential services. These services should include shopping, learning, healthcare, and leisure, which residents can reach from their homes on foot.

Moreno (2019) introduced the concept of chrono-urbanism, which refers to organising cities around time and within it lies the 15-minute concept. Chrono-urbanism is a broader city concept, and 15-minute cities define what goes into the city at a suburban level.

Chrono-urbanism emphasises the relationship between time and urban space, aiming to reduce commuting times and enhance the quality of life. It explores the need for humans to rethink how they perceive urban spaces, which can involve introducing greenery to areas, transitioning to carbon-free mobility, and leveraging technology to optimise services.

Cascallana considers time the most valuable commodity for people, and reducing the time they have to spend getting to places lies at the heart of Cascallana's work on Chrono urbanism and the 15-minute city.

Cascallana (2022) explored primary themes of environmental impacts and community relations, highlighting corridors and housing options. This is developed further in the sections below.

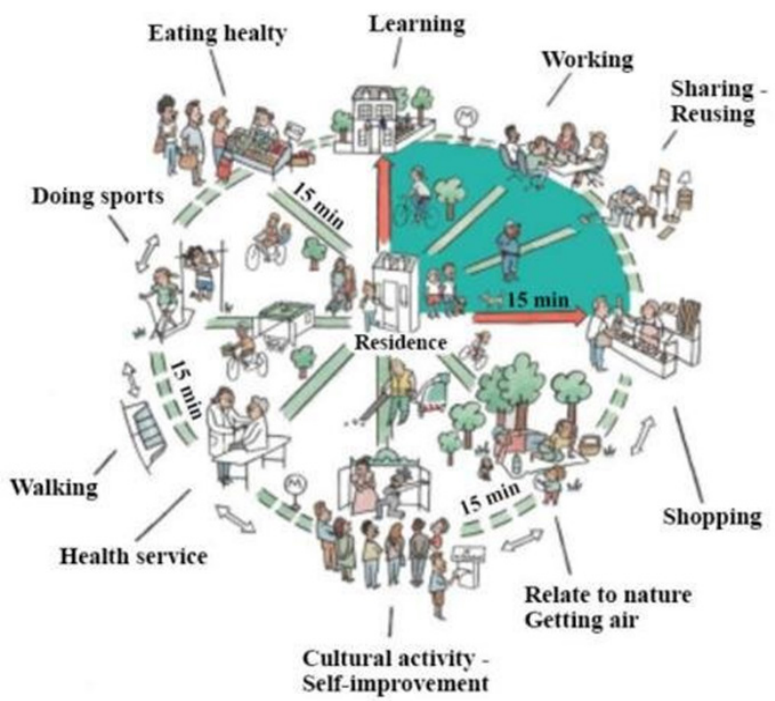


Figure 1:15-Minute concept of urban fabric. Paris En Commun,2020; Yıldırım & Özmertyurt. 2021

Cascallana illustrated their vision of a 15-minute city in Paris, France, using the example shown in Figure 1. The figure serves as a precedent that visualises the key goals of chrono-urbanism and shows how the different elements connect.

In Figure 1, Cascallana (2022) introduced a range of key amenities essential to 15-minute cities, all centred around the residence. Learning, shopping, physical activity, health services, and cultural activities are essential to modern life; these amenities prioritise individual well-being and exclude factors such as cars and roads.

Figure 2 below illustrates the 15-minute city above the Papatoetoe region, but the current street layout does not allow for equal access for all. If you could walk straight from the Papatoetoe train station outwards at a standard pace, roughly after 1.1km, you would reach the 15-minute mark (dotted circle). Everyone outside the circle would need more than 15 minutes to reach the services and amenities on foot.

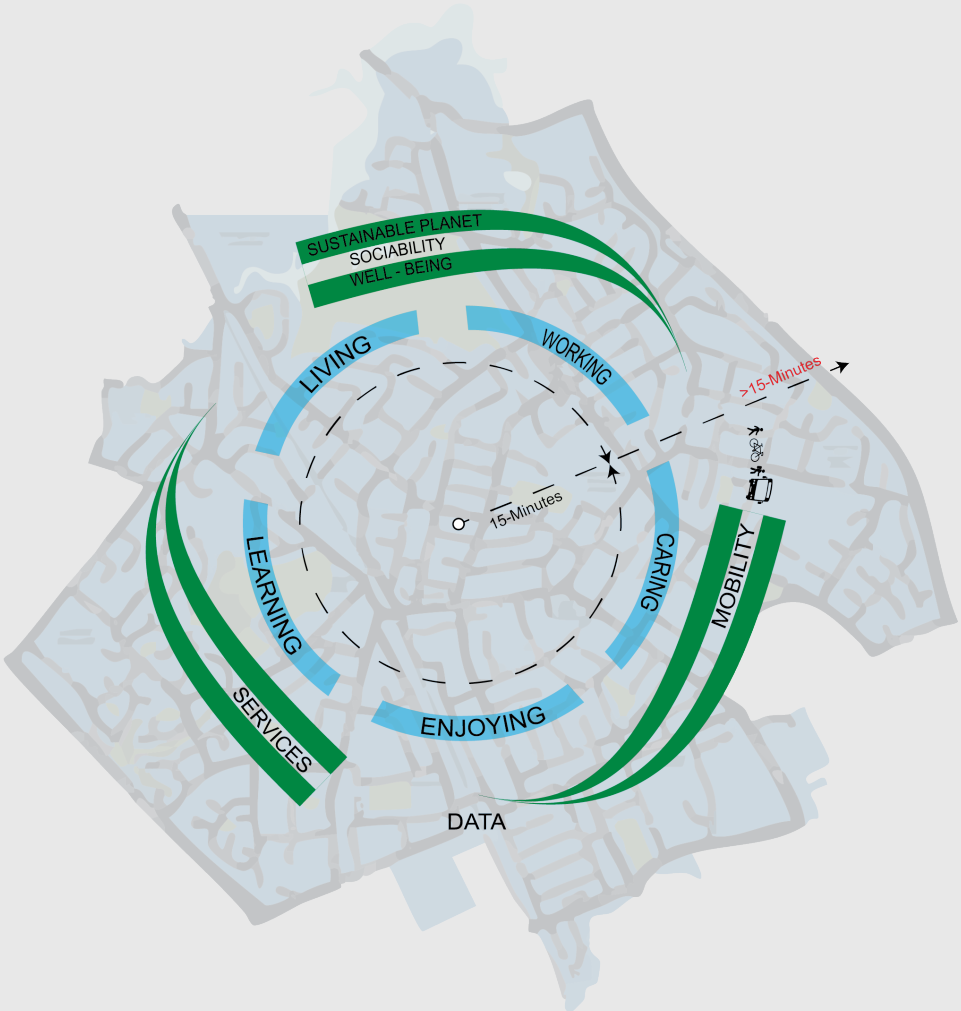


Figure 2: 15 Minute Diagram placed above Papatoetoe region centred around key drivers for a 15-minute city. 2025.

As a conceptual design solution, implementing these ideas in Papatoetoe would position the hub at the centre, with residential housing and local amenities extending outward. Outer local roads would be redesigned into pedestrian-friendly spaces, with the potential integration of autonomous vehicles running in loops to connect residents from distant areas to the hub. (Developed more in Part 2: Design Chapters).

Lessons for Papatoetoe:

This approach could help ensure equitable access to all amenities in the town centre, at the heart of Papatoetoe. By adopting the 15-minute city concept, they could be incorporated into the design of the intermodal transport hub and the layout of the streets, resulting in a better-connected Papatoetoe region. While Papatoetoe already offers a range of amenities, utilising the 15-minute city framework would enhance access for residents living farther away by focusing on improving transport networks, which could introduce new services in these farther zones. The project could gather data to identify essential amenities lacking in outer zones. From these insights, prioritised amenities can be strategically introduced within the central hub or along key streets to enhance accessibility and meet community needs. The 15-minute city starts to put humans at the centre of the design, so this prioritisation of humans over cars demonstrates how, as a community, we value healthier lives more than simply travelling faster to our destinations. We can utilise the 15-minute city model to analyse broader transport issues in Papatoetoe and then design the city accordingly.

Transport Oriented Development (TOD)

Transit-oriented development (TOD) enhances the 15-minute city concept by clustering housing, jobs, and services around public transport hubs, making essential amenities easily reachable by foot, bike, or bus. In Papatoetoe, where transport corridors are underutilised, TOD can address connectivity issues by promoting high-density development along major transit routes. Concentrating residential and commercial growth around train and bus systems ensures better service access while reducing reliance on private vehicles. In the book The New American Metropolis, Peter Calthorpe (1993) formalised the theory of transit-oriented development, which advocates for mixed-use, high-density developments near public transit to reduce car dependency, improve quality of life, and address environmental and social challenges. Calthorpe's approach centres on creating walkable, sustainable communities through transit-oriented development (TOD) principles.

A helpful example of transit-oriented development is the Rosslyn-Ballston Corridor in Arlington, Virginia, USA. The corridor was designed by citizens, staff, and county officials over 12 years and completed in 1972, utilising this TOD framework. Although the concept was formalised later, building around a transport network still existed, demonstrating thoughtful growth planning by focusing on high-density, mixed-use development along a major transit route while maintaining and improving existing residential neighbourhoods.

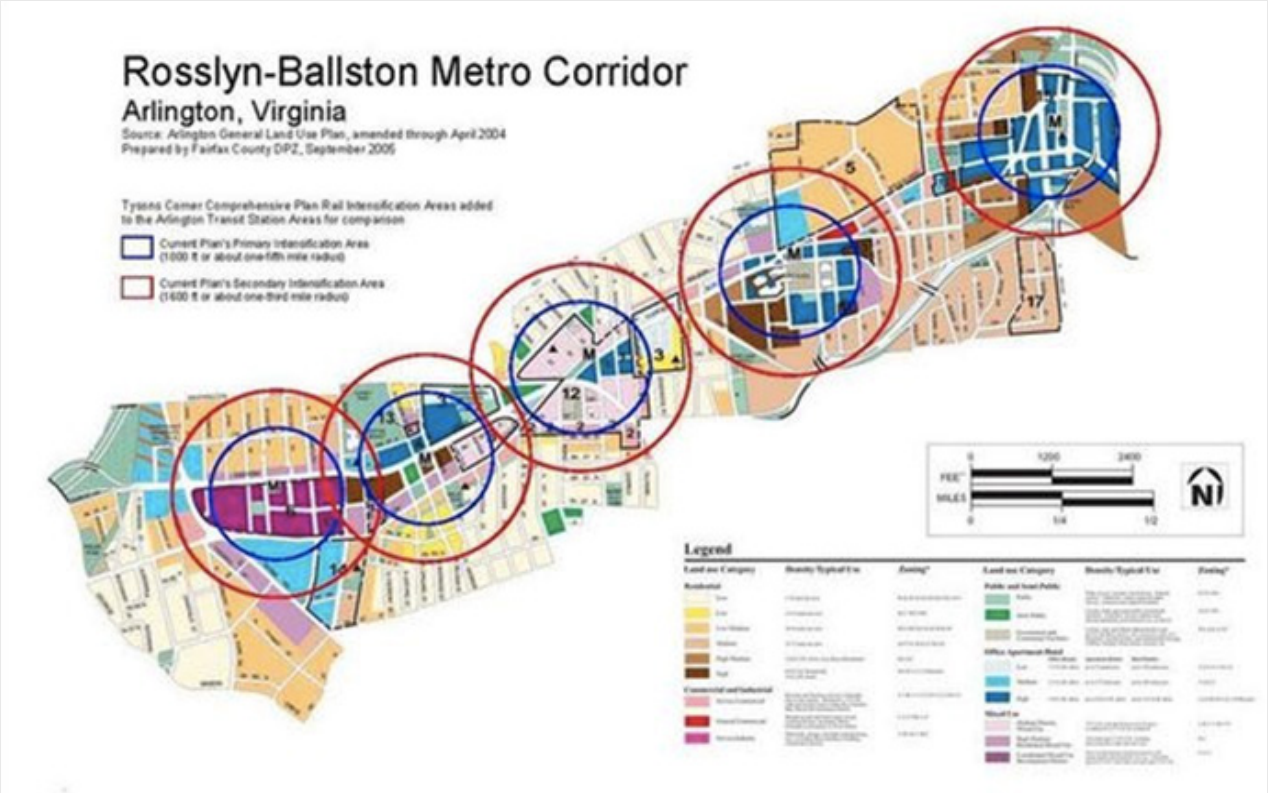


Figure 3: Transit-Oriented Land Use Plan for Arlington's Rosslyn-Ballston Transit Corridor. Shared by Deloney J on Pinterest. 2013

The motivation was to revitalise a declining urban area, increase public transit use, and reduce traffic congestion, creating a sustainable, liveable urban environment that balances growth with environmental and community well-being. It involved strategic planning, public-private collaboration, community engagement, and a focus on sustainability. This planning approach aims to develop cities sustainably (people Mountford & King, 2018) by emphasising high-density, mixed-use, walkable neighbourhoods.

Lessons for Papatoetoe:

The Rosslyn-Ballston TOD model demonstrates how high-density housing and mixed-use developments can successfully be clustered around transport corridors. This supports the proposal to integrate residential and commercial spaces within walking distance of the intermodal hub in Papatoetoe.

The corridor approach (rather than isolated hubs) suggests that improvements should not be limited to the immediate station areas but extended along key roads and transport routes. This could inform a broader networked approach for Papatoetoe rather than a single-site intervention.

The community engagement strategies used in Arlington can serve as a model for ensuring that Papatoetoe's transformation is aligned with local needs and priorities.

High-Density Corridor

The Papatoetoe region is currently a medium-density population area; converting it into a high-density space would require the addition of mixed-use developments such as housing and commercial buildings. High-density corridors are key elements of urban planning associated with transport-oriented developments along major transportation routes. This urban planning element is a sub-idea to transport-oriented development, focusing primarily on the nodes, districts, and corridors. Nodes are areas within cities where people and transport converge. Districts are spaces that host these points of convergence for public use, such as malls and shops, while the corridor serves as the linear pathway connecting nodes and districts (City of Edmonton, 2019). The ideas can create densely populated passages with various housing types, jobs, and zones along transportation routes (Dittmar & Ohland, 2024). These corridors can encompass a range of activities, thereby creating activity corridors. In conjunction with streets, this framework fosters structure and facilitates economic opportunities.

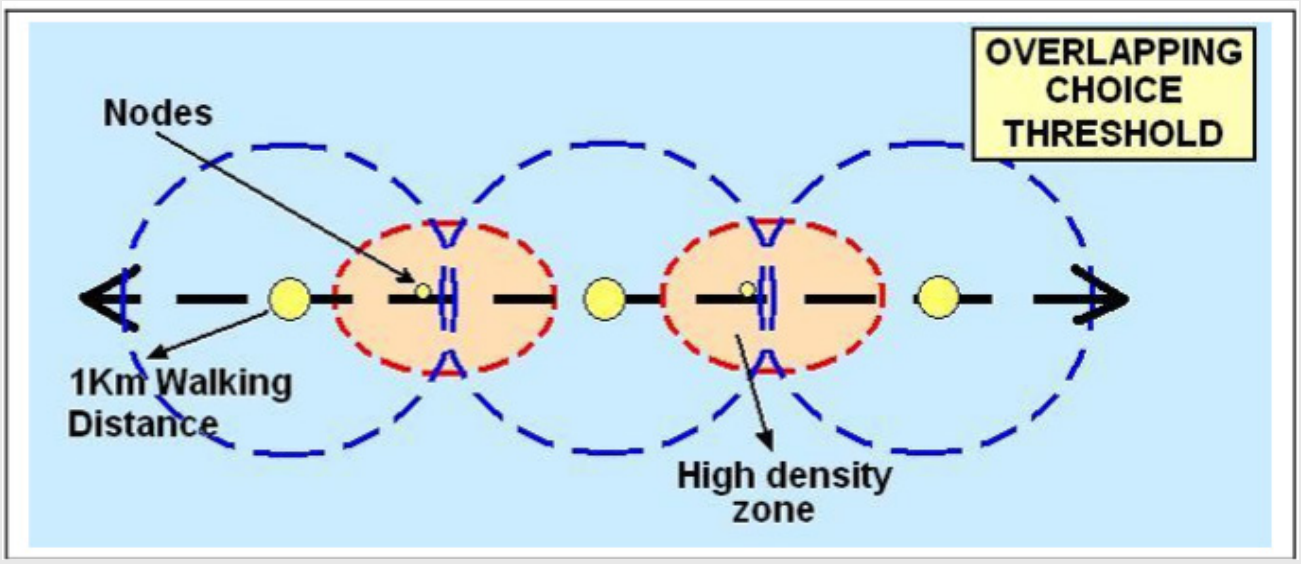


Figure 4: String of Beads Concept. Cape Metropolitan Council, 1996. Page 344.

Figure 4 shows these nodes and corridors across a plane, and high-density spaces are created within these points of intersection.

Warnich and Verster (2003) highlighted the significance of public transport as a catalyst for activity development. Different corridors must host distinct activities that generate nodes and enhance public transport usage. The more urban and infrastructure intervention is undertaken, the better and more developed the nodes and corridors can become. We can build vertically with high-density corridors, accommodating more individuals in a given area. When integrated with public transportation, high-density spaces create better-connected and less congested cities.

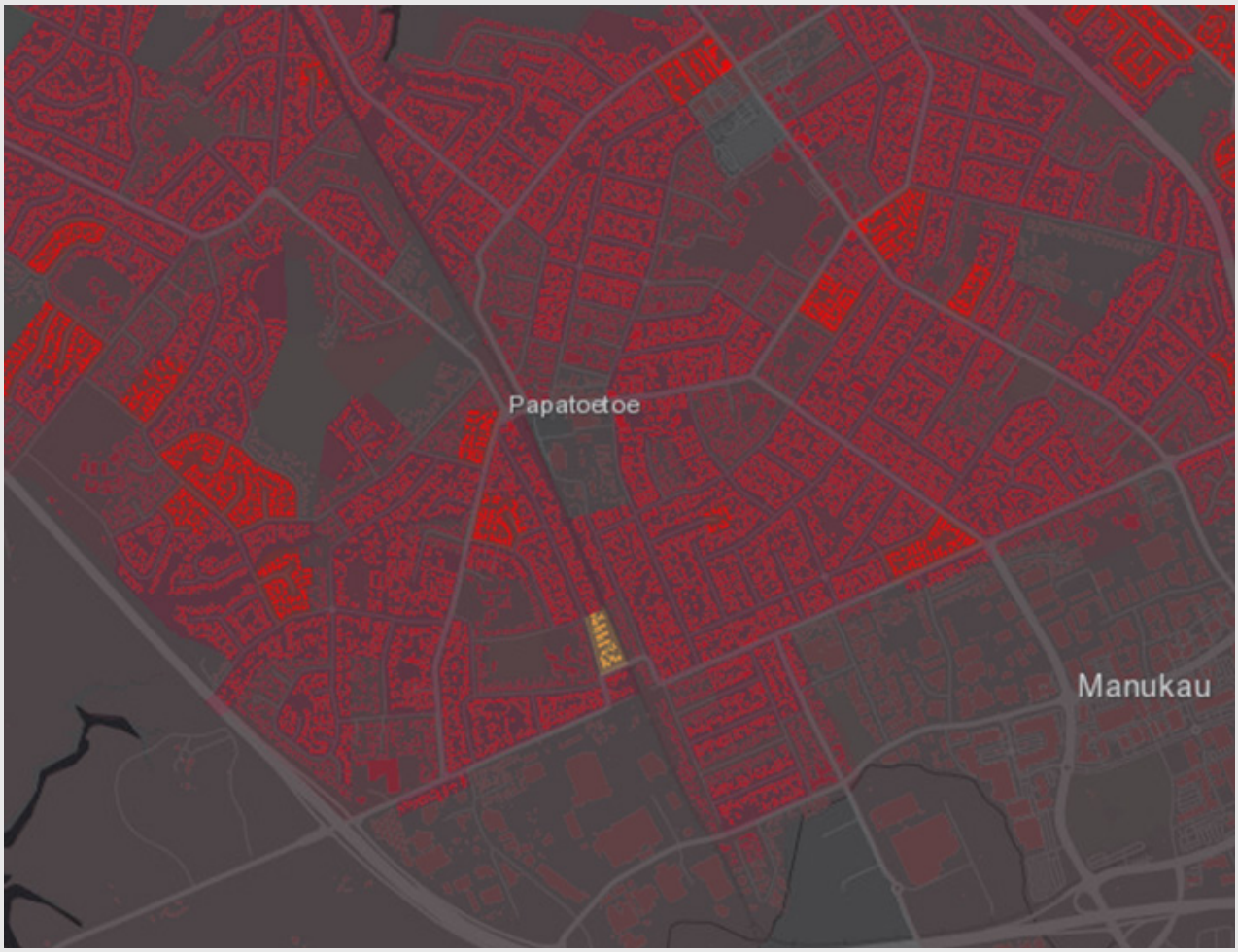


Figure 5: Mapping showing Papatoetoe's residential density. Atlas Publisher. 2024.

Transport-oriented development (TOD) and high-density corridors are interconnected. Thus, high-density corridors serve as spines for TOD, allowing designers and urban planners to concentrate on these routes for implementing mixed-use developments. For this research to make TOD effective, the density of the corridors needs to be increased. Developments around or near transit routes are not fully maximised, as evidenced by (Figure 5) the predominance of the red-shaded region covering a majority area of Papatoetoe. To improve this, further developments, such as apartment housing, would need to be constructed to establish a high-density corridor. It places user-centric design at the forefront rather than prioritising automobiles like cars. Consequently, we can add to the development of 15-minute walkable cities and help reduce carbon emissions.

TOD focuses on developing areas around a primary transport system, and high-density corridors accommodate population growth around these transport systems. Together, these should establish a high-density corridor that works with the TOD, giving residents better access to local amenities and connectivity services. Based on these considerations, the current study suggests that one way to generate and advocate for alternative spatial outcomes within transport design (see Research Question 3) would be to create high-density zones around transport lines by populating spaces with diverse housing, activities and amenities.

Site-Specific Architectural Precedents

Intermodal Mobility: Southern Cross Railway Station, Melbourne, Australia

Southern Cross Station, located in Melbourne, Australia, designed by Grimshaw Architects in 2006. It serves as a transport hub interchange. Southern Cross Station, formerly Spencer Street Station, is Melbourne's primary transport interchange. It was redeveloped to enhance connectivity between the two central regions at either end of the rail corridor. The new station, featuring glass facades, provides visibility for commuters and trains travelling long distances from the city (Grimshaw Architects & Stonell, 2010).

Figure 6: The redevelopment of Southern Cross Station began in 2002 and was completed in 2006. Photograph Creator: © Jes / Wikimedia Commons. 2007

Figure 6 shows the unique roofing structure spanning its multi-modal hub and open floor plan, which houses different shops and amenities. The roof was designed to minimise disruptions to the station while allowing commuters to move through seamlessly. As shown in Figure 6, this unique structure also incorporates architectural acoustics and mechanical services noise control for enhanced functionality (Marshall Day Acoustics, 2024). These learnings can be carried into the current project's design for the Intermodal hub in Papatoetoe and help create a precedent for development.

The roof structure is a striking and prominent feature of this train station. The journal-title 'Sculpted by the Wind' suggests that the roof was inspired by the movement of the wind around the vertices while also enabling users to see the rest of the city, connect multiple Melbourne regions under one roof, and provide a gateway to the city. The roofing serves a practical purpose; it acts as a "true skin… allowing it to breathe and sweat" (Grimshaw Architects & Stonell, 2010). By employing an innovative ventilation method and designing a structure (Figure 7) that requires regular maintenance, Grimshaw developed a system that facilitates natural ventilation, reducing fumes and circulating air within the building. The single layer of the roofing creates an airport-like atmosphere, with all the shops and amenities located on the same platform, cultivating a unique identity for the station

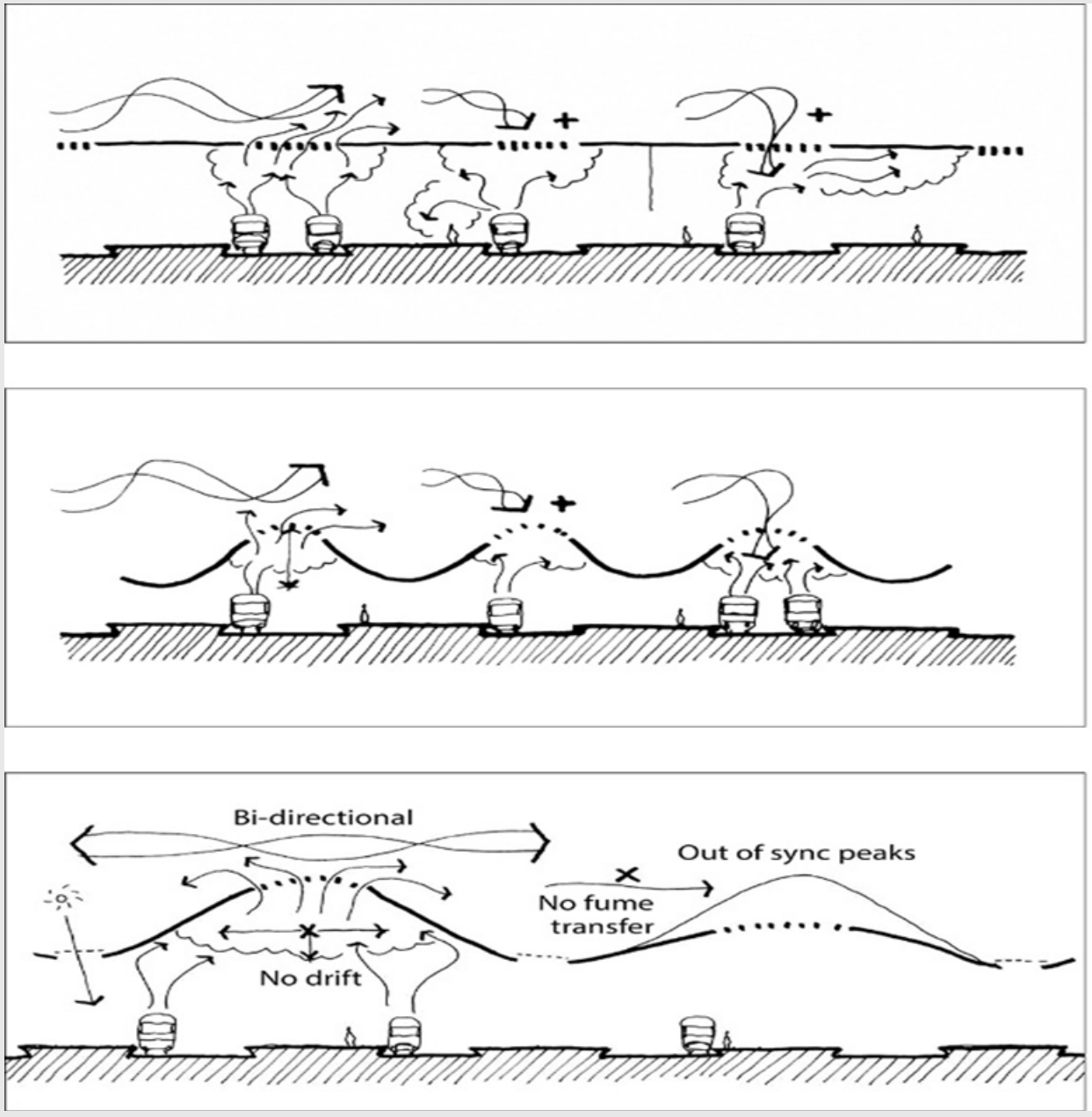


Figure 7: Diagram showing the roofing structure that allows for ventilation. Grimshaw Architects- Retrieved from Journal. 2010

Among the key concepts used in this project were sustainable architecture and contextual urbanism. The sustainable architecture stems from the wind-sculpted roof, which facilitates natural ventilation and rainwater harvesting (Santos, 2016). This contributes to sustainable design principles that should minimise environmental impact and enhance energy efficiency.
The principle of contextual urbanism was applied when Grimshaw Architects noted the rail corridor and the major roads surrounding the site during the redevelopment and aimed to work with these aspects in mind. Southern Cross Station serves as a central hub accommodating various modes of transportation, thereby increasing connectivity with the surrounding area of Dockland.

Advancing the concept of the hub accommodating various modes of transport would be a valuable enhancement to the proposed hub in Papatoetoe. By providing options for the residents regarding their mode of mobility, individuals of different ages and groups are more likely to utilise them, thereby promoting better connectivity in the neighbourhood. Another concept that can be integrated into the hub is placing different shops and amenities on the ground level, such as the train platform. Positioning amenities closer to public transport hub increases the ease of access for the public, who can, for instance, quickly go shopping when they get off the bus without having to detour to a supermarket.

Lessons for Papatoetoe:
The integration of mixed-modal transport (trains, buses, and pedestrian networks) serves as a model for the proposed intermodal hub allowing connectivity and better access points for the locals in Papatoetoe. The use of passive ventilation and open-plan layouts informs sustainability considerations and hopes to create a better atmosphere for the proposed Papatoetoe hub.

Hine-Pāka Bus Interchange

The Hine-Pāka Bus Interchange, located in Christchurch, New Zealand, was one of the first projects to be completed following the 2011 earthquakes. As part of the recovery plan, it was finished within 18 months. This naturally ventilated, light-filled transport hub creates an “efficient transport model” (Architectus, 2021).

Figure 8: Christchurch Bus Terminal showing the roofing structure. Architectus. 2015

The highlight of this project is the roofing design (Figure 8), the interior layout, and its variety of material choices. While the interior evokes an airport atmosphere, the spatial movement of buses is quite the opposite of that found in an airport, as discussed below.

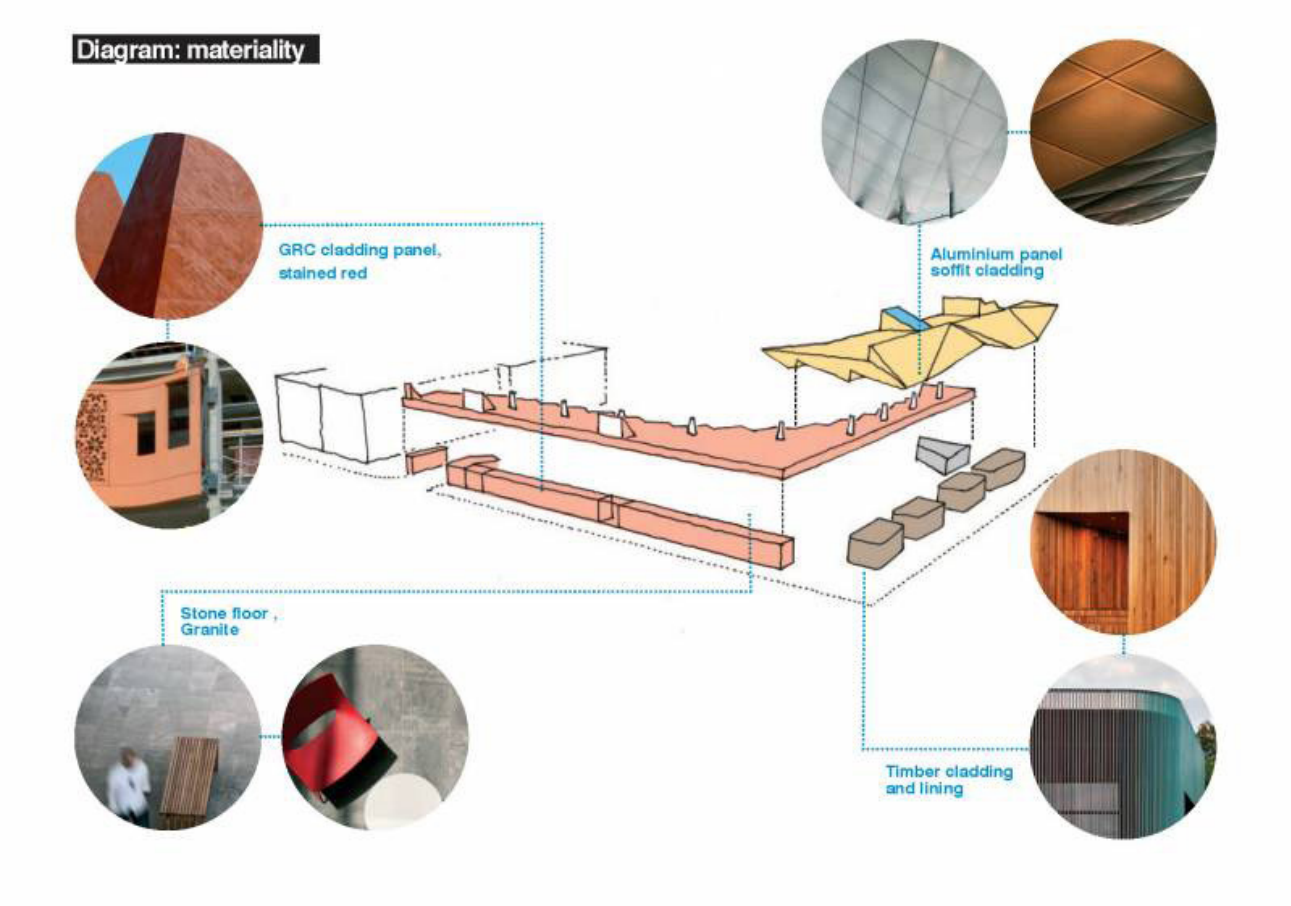


Figure 9: Diagram showing materiality in bus interchange. Architectus. 2021

Figure 9 illustrates the various materials and their application and how they were used in the building, shown on the roofing, the walls, and the terminal facades. The terminal also incorporates many environmentally sustainable strategies, including natural ventilation, natural lighting, radiant heating, a centralised ground source heat pump for heating and cooling, wind catchers, and skylights (Architectus, 2021).

The terminal features high ceilings that allow natural light to flood in, yet the shops lining the sides create a sense of overcrowding and neglect. The wooden shopping modules undermine the intended open space and act as barriers rather than access points. The current project would seek different design choices for the Papatoetoe Intermodal Hub to avoid similar issues. The round bus interchange is a tighter space for drivers to turn, creating reversing issues. Although technological measures have been implemented to address these problems, more effective urban planning and designing could have avoided them.

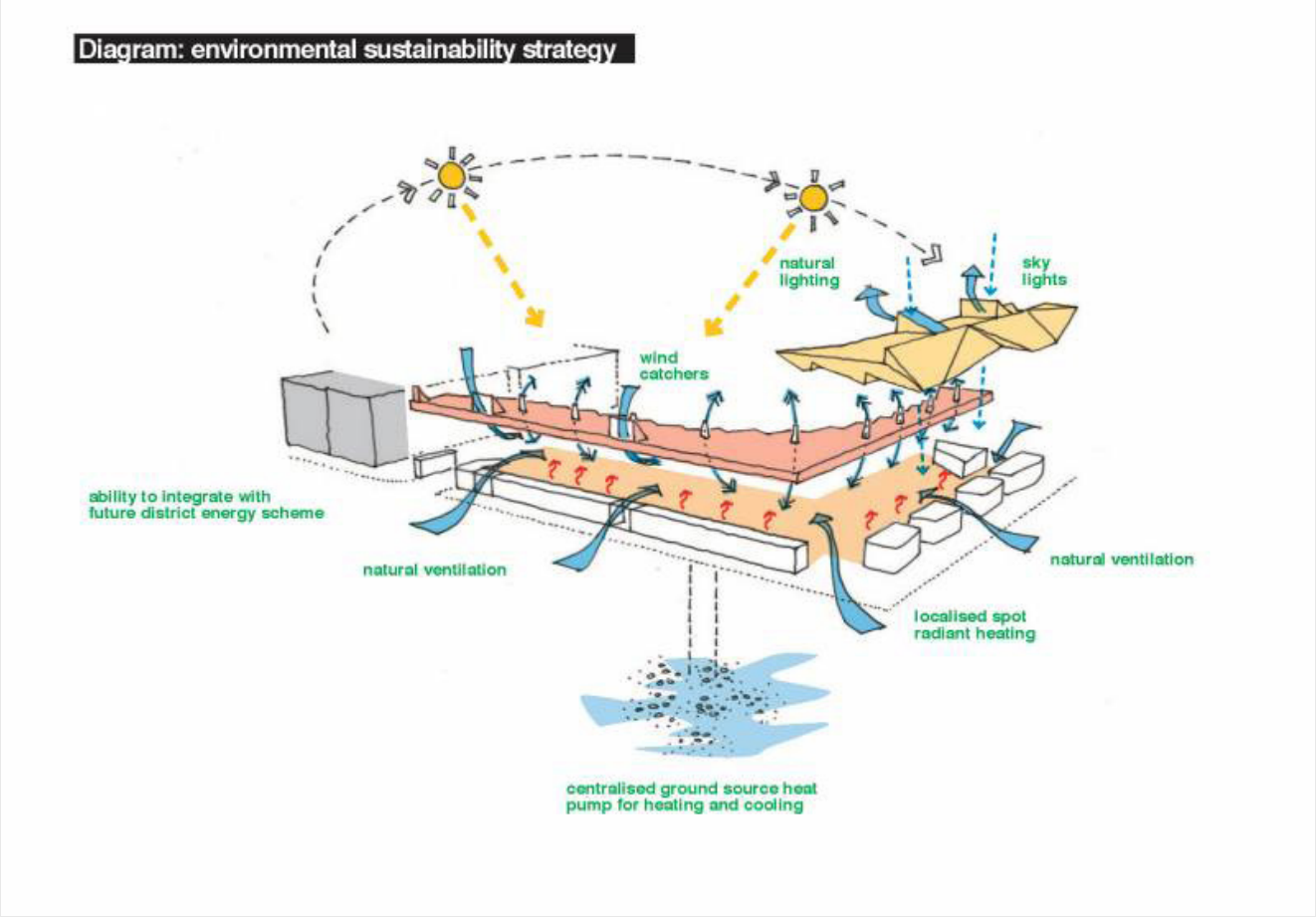


Figure 10: Diagram showing different environmentally sustainable strategies. Architectus. 2021.

Figure 11: Floorplan of the Christchurch Bus Interchange. Cycling in Christchurch. 2014.

Figure 11 shows that the interchange will likely cause traffic or accidents if one or more buses need to exit at the same time.

Lessons for Papatoetoe:
Using natural ventilation and skylights in Hine-Pāka improves user experience and energy efficiency. These elements can inform sustainable design strategies for the Papatoetoe intermodal hub.
However, the compact circular bus interchange layout in Hine-Pāka has led to tight turning spaces and manoeuvrability issues for buses. The Papatoetoe design should ensure more extensive, flexible bus circulation spaces to avoid similar congestion problems.
The placement of retail spaces within the transport hub in Christchurch increases convenience but also creates overcrowding issues. This is a cautionary example for Papatoetoe, where retail areas should be integrated to maintain openness and ease of movement.

King's Cross Station

Kings Cross Station, situated in London, England, underwent a remarkable transformation that re-vamped the historic station into a modern yet heritage-rich transport hub. The Great Northern Railway opened the station in Kings Cross in 1852, and the station has undergone numerous renovations over the years, with its most recent major renovation in 2012 (Kings Cross Station, 2015). Designed by John McAslan and Partners in 2012, the station remained operational throughout the entire construction project and showcased three distinct architectural styles: reuse, restoration, and new design-build. The remodel involved expanding the platforms and altering the train shed. All these alterations have resulted in a station that can accommodate 150,000 passengers daily or 50 million annually.

Figure 12: Kings Cross Station featuring its centrepiece attraction: The Semi-circle Concourse Entrance. ArchDaily, 2012.

Figure 12 above shows the semi-circular concourse, which houses numerous shops and amenities for commuters and locals. The historic building is nestled beneath the white steel structure, creating a safer and more pleasant atmosphere.

A notable feature of the Kings Cross station project is the semi-circular concourse at the station's west end. The concourse, combined with the preservation of the historical building, is one of the key aspects of the concept.

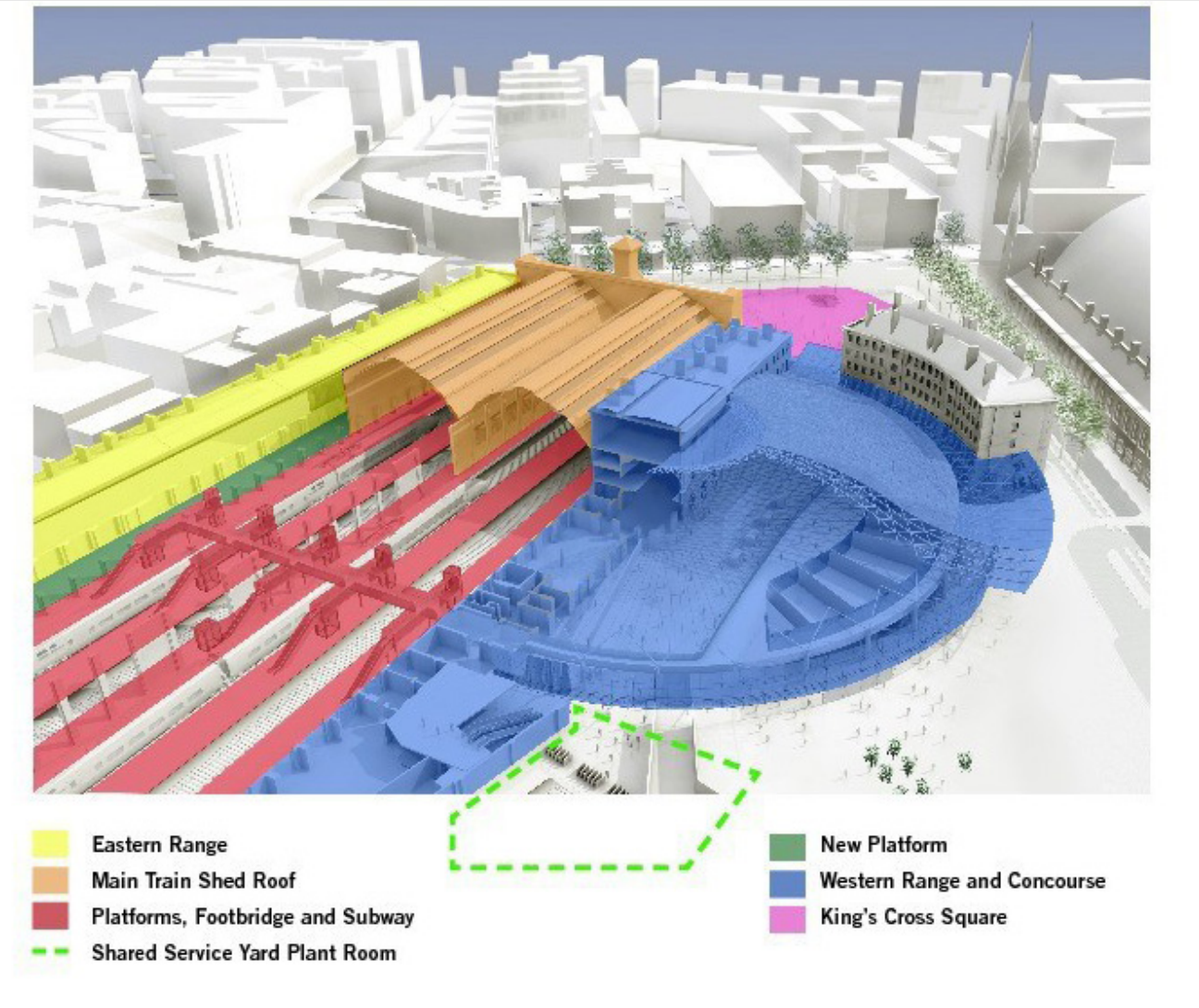


Figure 13: Diagram of Kings Cross Station outlining new development. ArchDaily. 2012

The concourse's circular shape (Figure 13) welcomes users and locals into the space. In addition to the transport options, users can also engage in retail or other amenities under the rooftop. The option of shopping and travelling in one space creates a freedom that the users can take advantage of, allowing time for other activities.

Figure 14 depicts the existing historic building alongside the new semi-circular concourse, which extends to the street, bringing the external shops under its structure. Various colours delineate different areas within a single structure, distinguishing between the train station's new and old aspects. Figure 13 below unites the existing façade and the new semi-circular concourse in a black-and-white elevation view, illustrating their remarkable integration as one project.

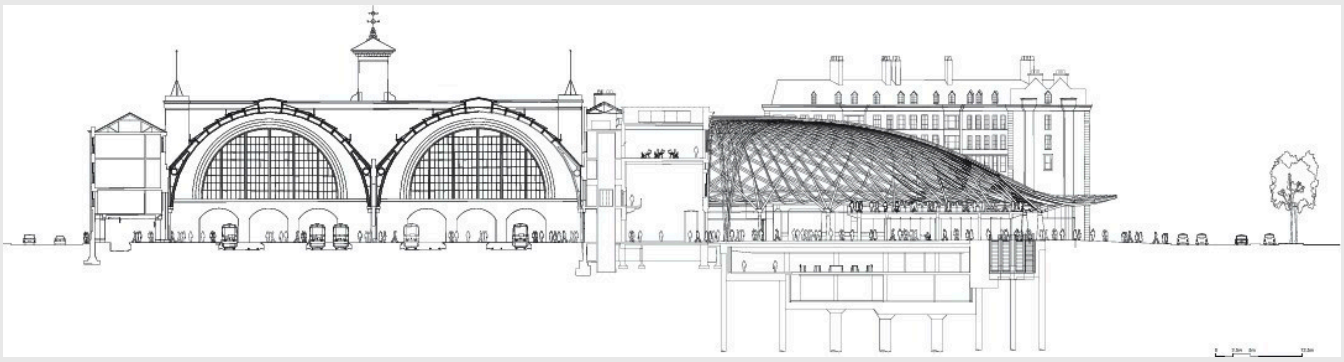


Figure 13: Diagram of Kings Cross Station outlining new development. ArchDaily. 2012

The key concepts used were historical preservation/adaptive reuse and urban regeneration. This ensured that the history of Kings Cross remained intact while modern methods were introduced to keep the train station safe and up to date. Aspects such as Victorian-era architecture, the train shed, and the iconic façade were revitalised to keep the history intact.

Lessons for Papatoetoe:

The adaptive reuse of heritage structures at Kings Cross Station demonstrates how existing transport hubs can be revitalised while maintaining their historical identity. While heritage preservation is not the primary focus in Papatoetoe, this case study highlights how design interventions can enhance existing infrastructure rather than replace it entirely.

The semi-circular concourse model offers an example of creating multi-functional transit spaces, combining transit, retail, and public gathering areas in one. This approach could be applied in the Papatoetoe hub to improve accessibility and community engagement.

Integrating public amenities within the station (e.g., shopping and dining) could influence the design of the intermodal hub, ensuring that essential services are placed near transit stops for convenience.

Suburban Scale Transformations

Suburban-scale transformations refer to the comprehensive changes and developments to improve a suburban area's infrastructure, functionality, and liveability. These transformations typically focus on creating more sustainable, efficient, and connected communities that address the evolving needs of residents. In today's urban development landscape, there is a growing emphasis on increased density and mixed-use developments that promote vibrant communities. Enhanced public transport and connectivity ensure that residents can easily access essential services and amenities, reducing reliance on automobiles. Furthermore, sustainable and green infrastructure is prioritised to create environmentally friendly spaces that support people and nature. Active transport options, alongside walkable environments, encourage healthier lifestyles, while community-oriented designs foster social interactions among residents. Finally, adaptive zoning and land use planning practices allow for flexible, innovative solutions that meet the ever-changing needs of urban populations.

The Pegasus Trail

The Pegasus Trail, a project by 100 Architects located in China, is an "urban public intervention" that "…intends to be a new typology of public space" (100architects, 2021). It is an existing project that wraps around Chongqing streets, creating an all-ages playground. It goes beyond the standard method of designing public spaces by bringing colour and storytelling to the urban streetscape. They focus on functionality and create spaces that go beyond the realms of regulations and laws. Prioritising pedestrians over cars exemplifies human-centred design playfully and invitingly.

Figure 15: The Pegasus Trail project located in Chongqing. © 100architects. 2021

Figure 15 incorporates a variety of playable equipment and amenities for locals of all ages, fostering a sense of community and creating a playful public space. When extended into the street redesign, this concept has the potential to enhance the urban environment significantly. By prioritising the walk-ability of the area and improving access to amenities in the Papatoetoe region, we can create safer and more inviting environments for residents, instilling a sense of hope for the future of urban design (Auckland Council, 2022).

Figure 16: Pegasus Trail implemented in the city landscape. Chongqing. © Rex Zou. 100 Architects. 2021.

Figure 16 illustrates the implementation of the Pegasus Trail within the city landscape, showcasing the design's unique and inviting nature. The playful use of colours and shapes has created a space that is not only functional but also intriguing, attracting users and sparking their curiosity in the urban environment. We can use this simple method of colour and shapes and implement it on a suitable site in Papatoetoe, which would be at Landscape Road and Fairview Road.

For suburban-scale transformation, the current design method regarding zoning and planning practices does not allow significant expansions around suburban neighbourhoods in Auckland (Auckland Council, 2025). To combat this, the research is speculative and hopes to raise awareness and spark curiosity about what might become possible if transport patterns shift. "The goal of suburban redesigning is to bring some much-needed walkable urbanism to the suburbs" (Steuteville, 2021).

Lessons for Papatoetoe:

Colour, storytelling, and playful design in the Pegasus Trail show how suburban streets can be transformed into inviting public spaces. Papatoetoe's redesign can incorporate these ideas by introducing interactive elements such as seating, greenery, and wayfinding features to enhance walkability.

The pedestrian-prioritized design of Pegasus Trail aligns with the 15-Minute City concept, reinforcing the idea that streets should serve as community spaces rather than just transport corridors.

While Chongqing's high-density environment supports such an intervention, suburban Papatoetoe may require scaled-down versions of these ideas to fit its context.

The Offset House

A conceptual project called Offset House, which was designed by Other Architects and is situated in Australia, “demonstrates how the outer walls of a large, detached single-family home can be re-zoned to accommodate multiple inhabitants and a range of functions” (Pozniak, 2016). The concept ‘offsets’ the existing structure of suburban houses and introduces a new internal layer to the original building area. A space between the two zones is created by carrying the external cladding to the interior wooden framing. Revealing the wooden framing can create verandas and outdoor spaces that can be transformed (Lynch, 2015).

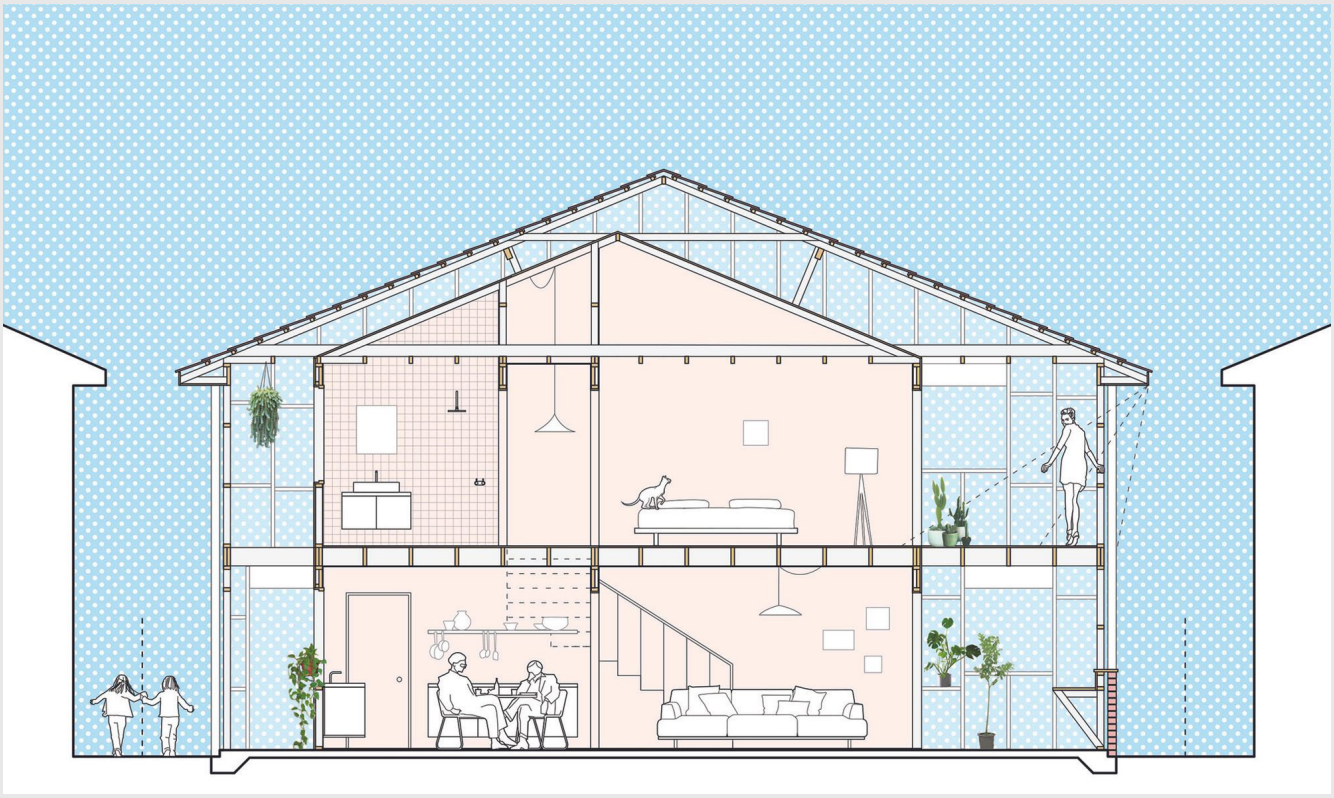


Figure 17: A new volume is literally “offset” within the existing frame to provide shade, privacy, and ventilation. Other Architects. 2025

Figure 17 illustrates the two zones within a single envelope, not by reducing space but by increasing it. Residents benefit from additional open spaces, and the exterior envelope facilitates ventilation.

Referring to this method as a ‘skin,’ we can establish a versatile approach for designing future suburban houses. Implementing this removes the need for fences and facilitates better communal activities. By bringing the internal architecture of timber framing to the external envelope, we can create various areas under the same roof. “By reclaiming the frame for architecture, we hope to reframe our relationship to the suburbs” (“Offset House,” n.d, Paragraph 2).

Figure 18 illustrates the skin envelope, which shows the before and after of six housing plans where we can see the urban difference once the external walls were taken inside. Community space is created by eliminating fences and walls in houses.

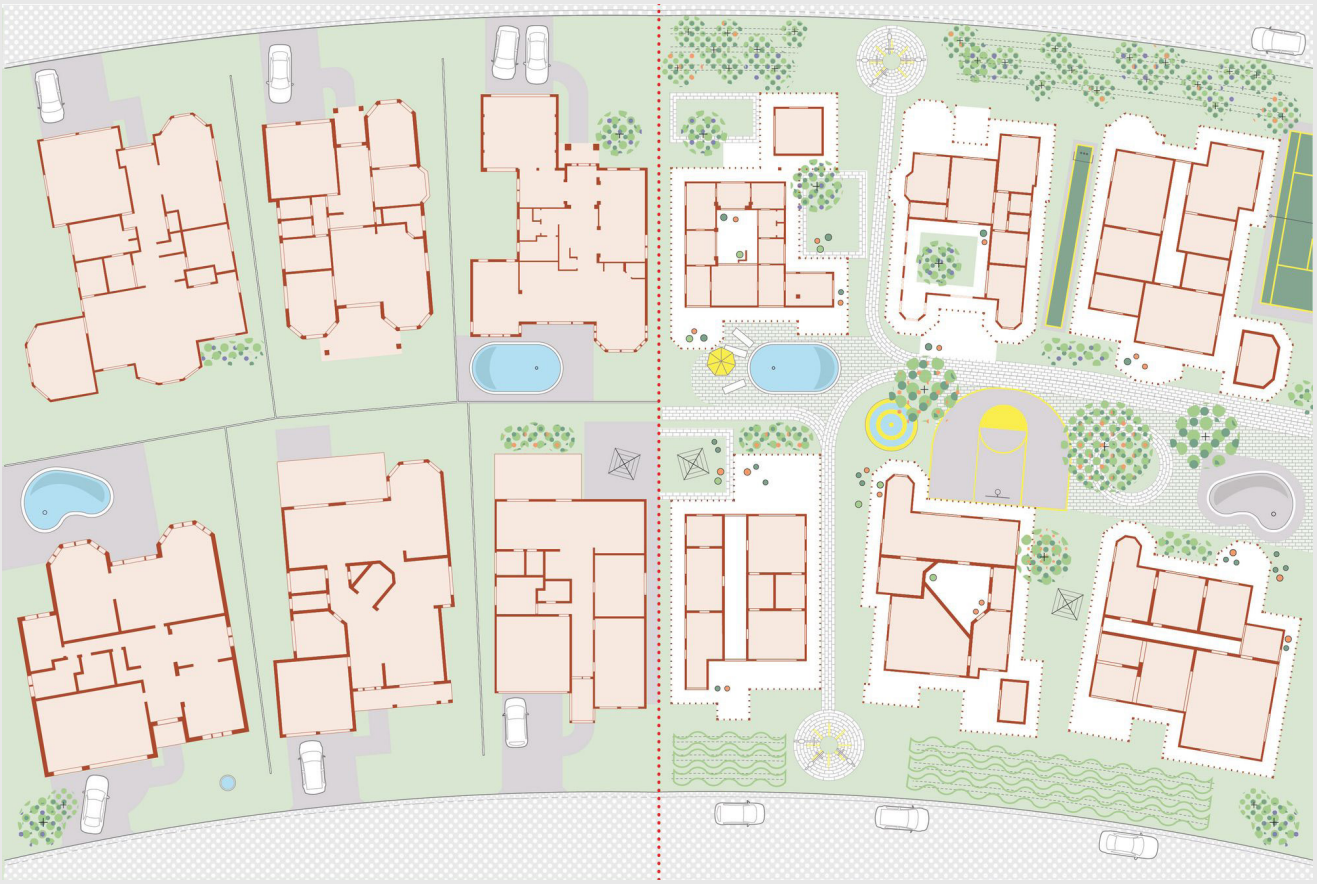


Figure 18: The 'Skin' concept is shown in the floor plan without demolishing the homes. Other Architects. 2025

Figure 19: Concept of Offset House showing fence-free space creating a communal area. Other Architects. 2025

Figure 19 illustrates the timber structure employed as an external façade, while the original external façade has been relocated indoors. Fences are dismantled, removing the necessity for boundaries and fostering an open-plan layout for the local community.

This concept is vital to the redesign of suburban streets. It transcends standard building regulations by integrating the spaces in front gardens into the overall design. In doing so, we can challenge land use regulations and foster improved environments for residents. Furthermore, these regulations could encompass certain elements related to hub integration.

Implementing a project like the Pegasus Trail and Offset House in Papatoetoe would be challenging due to the restrictive nature of zoning. For example, under the Auckland Unitary Plan, Auckland is divided into various categories and zones (Auckland Council, 2025). These guidelines and regulations assist us in designing in harmony with the environment, the heritage of spaces, cultural aspects, and people's conservation efforts. I propose adding these regulations for this research to allow future growth and changes.

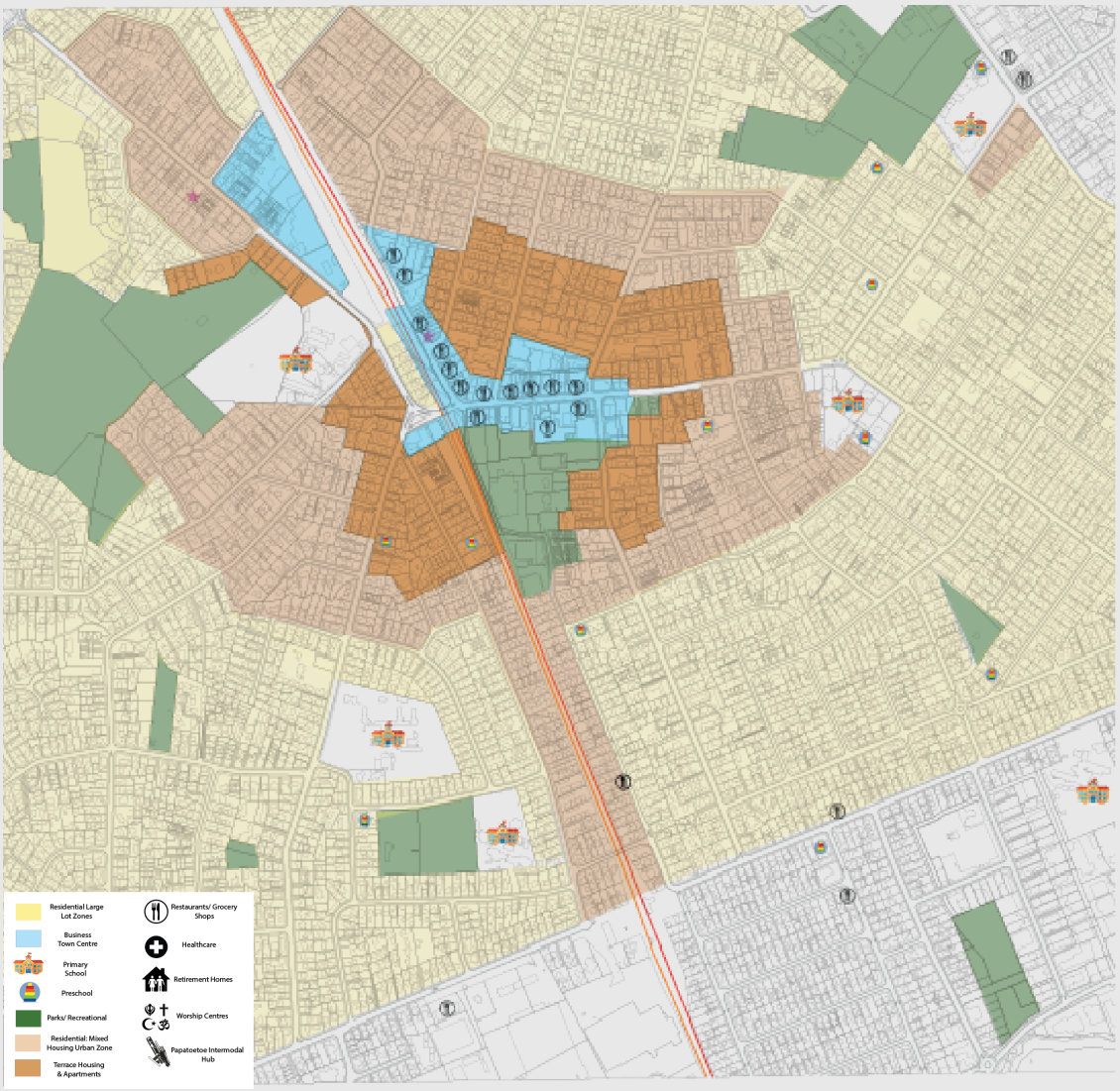


Figure 20: Auckland Unitary map showing different zones in the Papatoetoe region. 2025

Figure 20 is colour-coded with different zones currently implemented in Auckland and Papatoetoe. Papatoetoe comprises a mixture of different housing types, but the large-lot zones in the surrounding areas make it harder to develop the Papatoetoe region. The goal is to increase residential density by building more apartments, as this would impact how zoning regulations are established. Building height regulations can be improved, and adding to these land use regulations would transform suburban streets.

The Offset House project mentioned above aligns with this notion of going beyond standard designing and building, focusing on under-utilised land around suburbs and incorporating street amenities that benefit residents. In Papatoetoe's context, these under-utilised lands would be sourced from the front yards of residents' homes with large lots, providing greater access for street projects. By utilising a small portion of land, residents would gain access to various amenities they can use at their convenience. Rethinking housing design in the future regarding land wastage and usage would align well with taking a new approach to the suburban streets that could be designed.

Suburban-scale transformations seek to establish sustainable, efficient, and interconnected communities. This integrated solution could utilise principles from Transport-Oriented Design (TOD), high-density corridors, mixed-modal transportation, and transport hubs. By cohesively implementing these strategies, suburbs can develop into vibrant, liveable spaces that emphasise accessibility, sustainability, and user experience. This approach fosters a design solution that strives to create a balanced, interconnected suburban environment, enhances transportation efficiency, encourages sustainable living, and promotes a high quality of life for residents.

Lessons for Papatoetoe:
The "offset" concept of reconfiguring suburban homes for shared outdoor spaces aligns with the need to rethink land use in Auckland suburbs. Applying this strategy in Papatoetoe could mean redesigning street-facing areas to promote communal spaces rather than isolating properties behind private fences. The idea of using underutilised spaces for public benefit reinforces the research argument that suburban streets can be transformed into active, mixed-use spaces rather than just transport routes.

City Scale Transformations

São Paulo

City-scale transformations are a concept that focuses on city regeneration. Through these interventions, cities can continuously grow, enhance, and innovate their functions, addressing resident's needs for the community's better health. One example of city-scale transformation is São Paulo, located in Brazil, which has shifted its administrative centres four times in the past few hundred years (Moura et al., 2016, p. 137). As a result, urban centres have also adjusted, creating new spatial opportunities.

In 2014, São Paulo unveiled an ambitious Master Plan (Plano Director Estratégico de São Paulo) to address the city's complex urban challenges (Maes et al., 2021, p. 19). Central to this vision was delineating macro-areas—strategically defined zones, each with distinct objectives focused on promoting sustainable growth, environmental preservation, and socio-economic equity. These macro-areas are not just a part of the plan; they are the backbone of how São Paulo reshapes its urban landscape, underscoring the significance of strategic urban transformations.

The macro-area of "Controlled Urban Expansion" aims to tackle the challenges posed by rapid urban growth by prioritising the development of peripheral zones. To achieve this, several key strategies were implemented: planned housing developments were encouraged to deter the emergence of informal settlements; transport and infrastructure were thoughtfully integrated to support the establishment of new communities; and ensuring access to essential public services and amenities was prioritised. This comprehensive approach aspired to transform these peripheral areas into sustainable urban extensions, ultimately reducing the risk of uncontrolled urban sprawl.

Figure 21: Infographic showing a quick overview of one part of the São Paulo Masterplan. (Macro Areas). City of São Paulo. Strategic Masterplan. 2014.

Figure 21 highlights key mobility guidelines in the master plan. A pivotal aspect of the 2014 Master Plan was its alignment with TOD principles. The plan promoted higher-density, mixed-use neighbourhoods that encourage walking, cycling, and public transit by concentrating development along public transport corridors. This strategy reduced reliance on private vehicles and addressed socio-regional inequalities by bringing housing and jobs closer together. Ultimately, the goal of the master plan was to create a more integrated urban environment that fosters economic opportunity and social cohesion.

This master plan was approved and implemented on 30 June 2014 and enacted on 31 July by Mayor Fernando Haddad through participatory processes involving public hearings, meetings, and workshops over several years (Urban Management SP, 2013). In 2015 and 2018, “law changes were enacted that established general guidelines for the planning, management, and execution of public functions” (Maes et al., 2021, p. 19). In late 2019, real estate agents exerted pressure to alter the “principal instruments” (Back et al., 2022, p. 235), which referred to the urban planning tools, policies, and mechanisms used to regulate land use connected to São Paulo’s masterplan design of creating compact cities. With the introduction of the master plan, several laws and policies have been created to pave the way for the smooth implementation of the master plan.

Although the master plan is designed for São Paulo, the principles outlined in the 2014 plan can generally serve as a foundation for building a resilient and inclusive city. By prioritising strategic urban transformations, we can place humans at the centre of designing future cities. In the context of Auckland, we can adapt the macro-area concept and create different urban solutions that collectively contribute to a resilient and connected city, using the transport network system as a reference point. Another macro intervention we can implement is redesigning suburban streets (Developed further in Part Two: Design); by changing how streets are designed, we can emphasise walkability for pedestrians over cars on the roads.

This approach aligns with São Paulo's vision of developing a complex urban city. São Paulo's masterplan permitted changes to the laws and regulations, creating more minor impacts. However, it is awaiting the right moment to implement all changes. Implementing a macro area would require only minor changes to the land use regulations in Auckland, but these changes would significantly impact the possibilities of urban planning.

Copenhagen

In 1947, Copenhagen, Denmark, introduced a unique urban planning strategy called the" Finger Plan". This plan focused on urban development along five corridors from the city centre into rural areas. The plan primarily centred around stations as focal points for high-density housing accompanied by local shopping facilities, creating a well-connected and sustainable urban environment (Sørensen & Torfing, 2019).

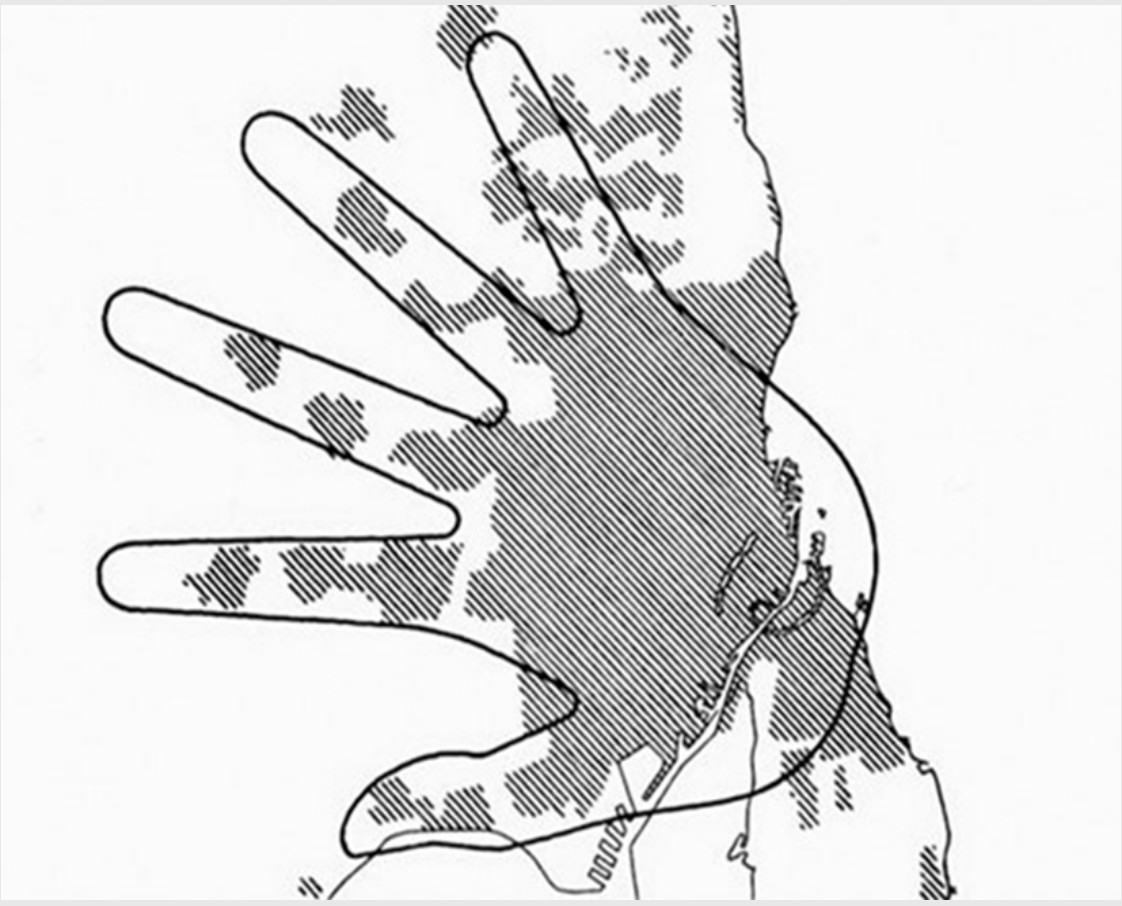


Figure 22: Illustration of Copenhagen's 1947 Finger Plan. Egnsplankontoret. 1947.

Figure 22 shows the developments extending outwards from their historic city in five sections resembling the shape of a hand. These established corridors have integrated public transportation, green spaces, and reduced car needs.
Open green spaces preserved between these “fingers” serve agricultural, recreational, and ecological purposes. By designing within these corridors and implementing transit-oriented development (TOD) strategies, Copenhagen has fostered a city that minimises car dependency while enhancing ecological functions, seamlessly connecting nature with its residents (Sørensen & Torfing, 2019).

Figure 23: The map of Copenhagen at present times having remnants of the finger c from 1947. Google Maps. 2025

Figure 23 illustrates how the finger plan adopted by Copenhagen preserved its main transport corridors. Over time, the areas have become densely populated while maintaining sufficient green spaces. This development could further enhance the transport system and demonstrate the introduction of transport-oriented development on a larger scale. Regarding the Papatoetoe region, which is considerably smaller, we can still introduce and implement this strategy to expand it across Auckland in the future.

Literature and Precedent Review Conclusion

For a transport network to be effective, it must operate as an interconnected system across multiple scales. This research design engages scale at the hub, suburban street, and regional levels, ensuring seamless integration between mobility solutions. Each scale presents a unique opportunity to optimise accessibility, efficiency, and urban liveability.

Integrating the principles of the 15-minute city, Transit-Oriented Development (TOD), and high-density corridors offers a revolutionary strategy for urban planning and transport infrastructure, particularly for Papatoetoe. The 15-minute city framework emphasises human-centred design, minimising travel distances and ensuring essential services are within walking distance, which boosts accessibility and community health. Additionally, TOD initiatives and high-density corridors enhance urban connectivity by promoting mixed-use developments along major transport routes, decreasing reliance on cars, and fostering lively, pedestrian-friendly communities. Suburban scale transformations such as The Pegasus Trail highlight the necessity of zoning reforms, innovative growth initiatives, and collaborations between public and private sectors to create efficient and equitable urban environments. Notable international examples, including São Paulo's 2014 Master Plan, Copenhagen's Finger Plan, and successful TODs like the Rosslyn-Ballston Corridor, underscore the significance of merging public transport with sustainable urban design and community-focused development.

By engaging with various urban scales—from intermodal hubs to suburban streets and regional transport corridors—this research envisions a cohesive, human-centred transformation for Papatoetoe and the greater Auckland area. Integrating transit-oriented development (TOD), high-density corridors, and pedestrian-first design offers a scalable and adaptable strategy to enhance urban mobility, support sustainable growth, and improve residents' quality of life. This study provides a framework for future integrated, people-focused urban development in Auckland by reimagining the relationship between transport, housing, and urban space.

Chapter Two: Methodology Chapter

This chapter outlines the research methodology used to explore how intermodal transport hubs can transform suburban streets and improve urban mobility in Papatoetoe. Given the complexity of transport-oriented development, the study adopts a practice-based research approach that integrates mixed methods and design thinking to develop a site-specific architectural intervention.

Methodology Introduction:

This research follows a two-pronged methodology:
1. Mixed Methods Approach – Incorporates qualitative and quantitative data to establish an informed foundation for the design (George, 2023). This includes:
• Literature and precedent review to examine best practices in urban mobility and transit-oriented design.
• Traffic data analysis from Auckland Transport (Saunders et al., 2021) to identify high-congestion areas and under-utilized corridors, informing the placement of intermodal hubs.
• Urban mapping techniques such as distance mapping and controversy mapping to visualise mobility challenges and opportunities.

2. Design Thinking Approach – A human-centred, iterative process that translates research insights into architectural solutions (Han, 2022). This involves:
• Site selection and multi-scalar analysis to test the impact of intermodal hubs at regional, suburban, and neighbourhood levels.
• CAD modelling and prototyping to develop design concepts for transport hubs and pedestrian-friendly streets (Brown, 2009).
• Iterative testing of various transport-oriented layouts to refine accessibility, efficiency, and spatial organisation.

The methodology is structured into four phases, ensuring a systematic progression from research to design implementation (Figure 20 below)
1. Phase One – Research & data collection: Identifies site potentials, literature precedents, and key transport issues in Papatoetoe.
2. Phase Two – Concept development: Synthesizes research insights into design ideation and prototyping.
3. Phase Three – Site-specific design solutions: Applies transport-oriented strategies to develop contextual design interventions.
4. Phase Four – Final design integration: Evaluate and refine the proposed architectural solutions based on their urban impact.
This methodology provides a comprehensive framework for analysing, designing, and testing architectural interventions integrating transport and urban planning. Combining empirical research with design experimentation, the study aims to develop scalable solutions that enhance mobility, accessibility, and urban liveability in suburban contexts.

Curated Diagram

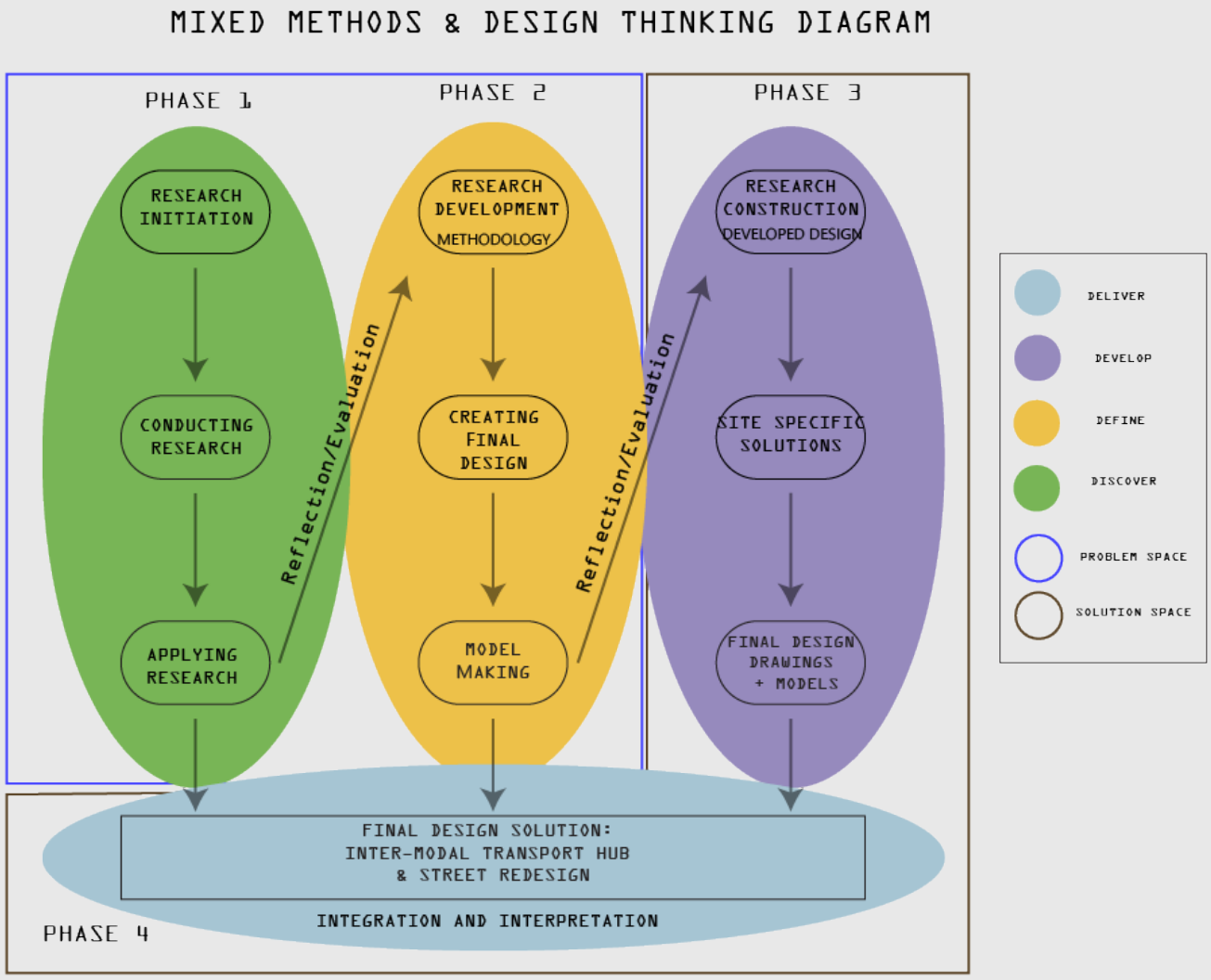


Figure 24: Mixed Methods and Design Thinking Curated Diagram. 2025

Figure 24 presents a methodological diagram integrating mixed methods and design thinking (Brown, 2009), the two research approaches that inform this practice-based thesis. This figure combines an existing diagram for a multi-phase design, described as "holistic, comprehensive and actionable…to identify the most effective strategies" (Alele & Malau-Aduli, 2023) and another diagram that illustrates a "framework that enables companies to apply design characteristics to discover creative solutions" (Elmansy, 2021). The design thinking characteristics follow five key drivers (Figure 26) and are included in this research project. Essentially, the steps involved in this practice-based research were the critical analysis of relevant literature and precedents, examining existing data, and, ultimately, the testing and iteration of the findings within a New Zealand and local context.

Although mixed methods employ qualitative and quantitative data approaches, this practice-based research only uses the diagram's framework (Figure 25). However, it does not carry over the principles used (Alele & Malau-Aduli, 2023). By merging mixed methods and design thinking approaches, a methodology could be established to facilitate the analysis of pre-collected resources and enhance the design workflow.

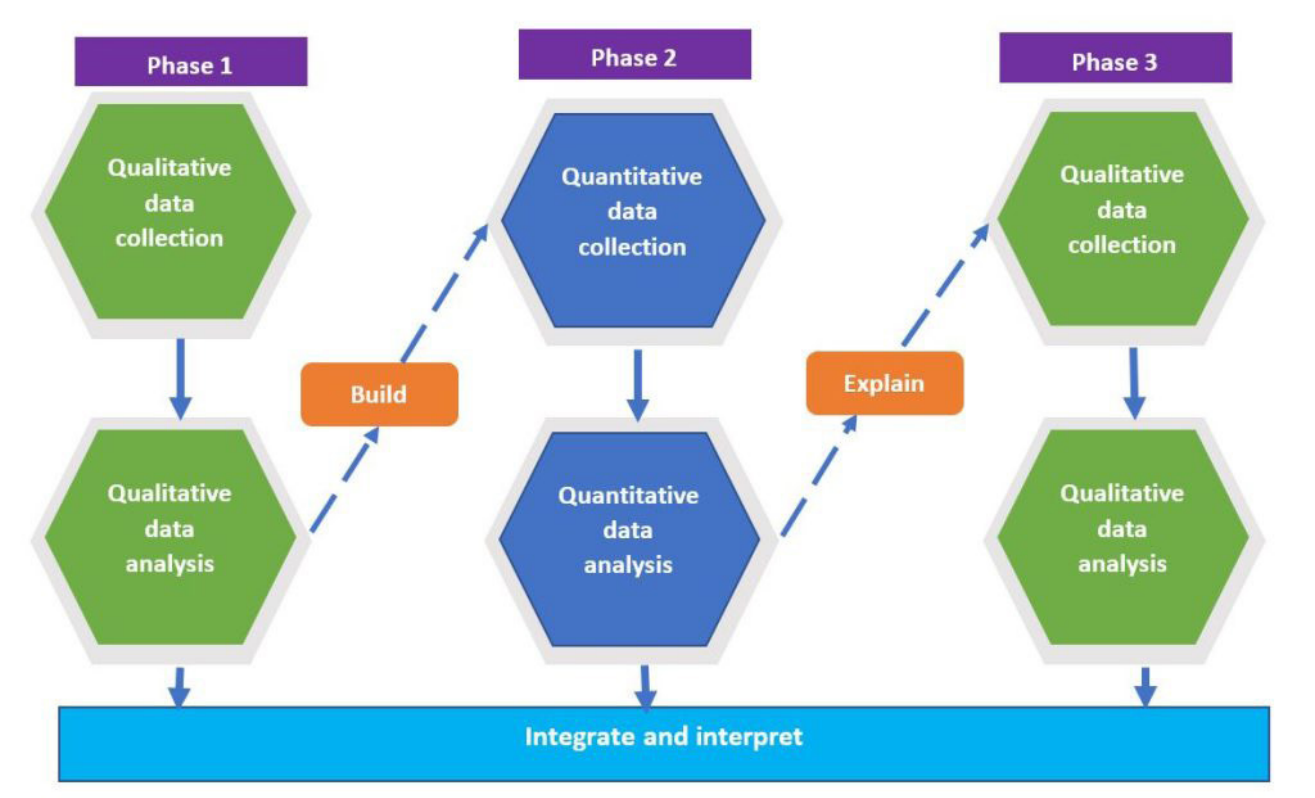


Figure 25: Multiphase mixed methods design by Bunmi Malau-Aduli and Faith Alele, used under a CC BY NC 4.0 licence. 2023.

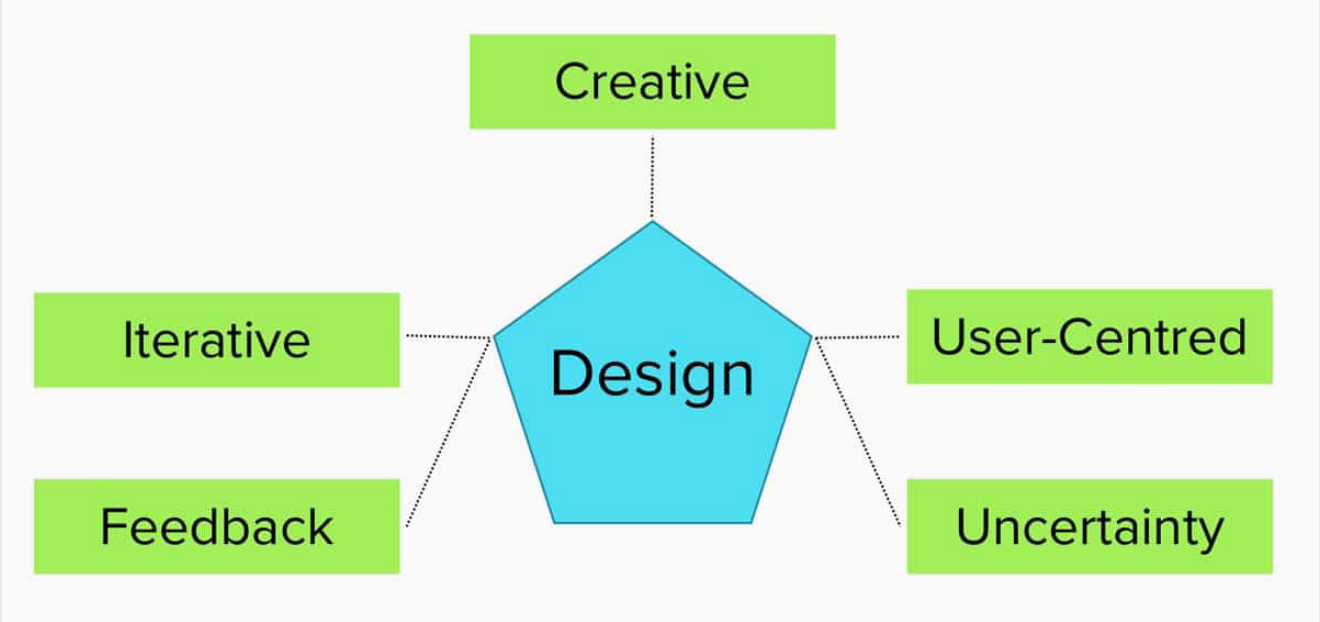


Figure 26: The main characteristics that remark the design thinking process. Elmansy R. 2021

Figure 26 shows the main characteristics of the design thinking process applied to this research, mainly in Part Two, under the Design Project heading.

The design thinking (Figure 27) created the idea of problem space and solution space when combined with mixed methods, allowing for the diagram splitting and defining the issues to become more straightforward.

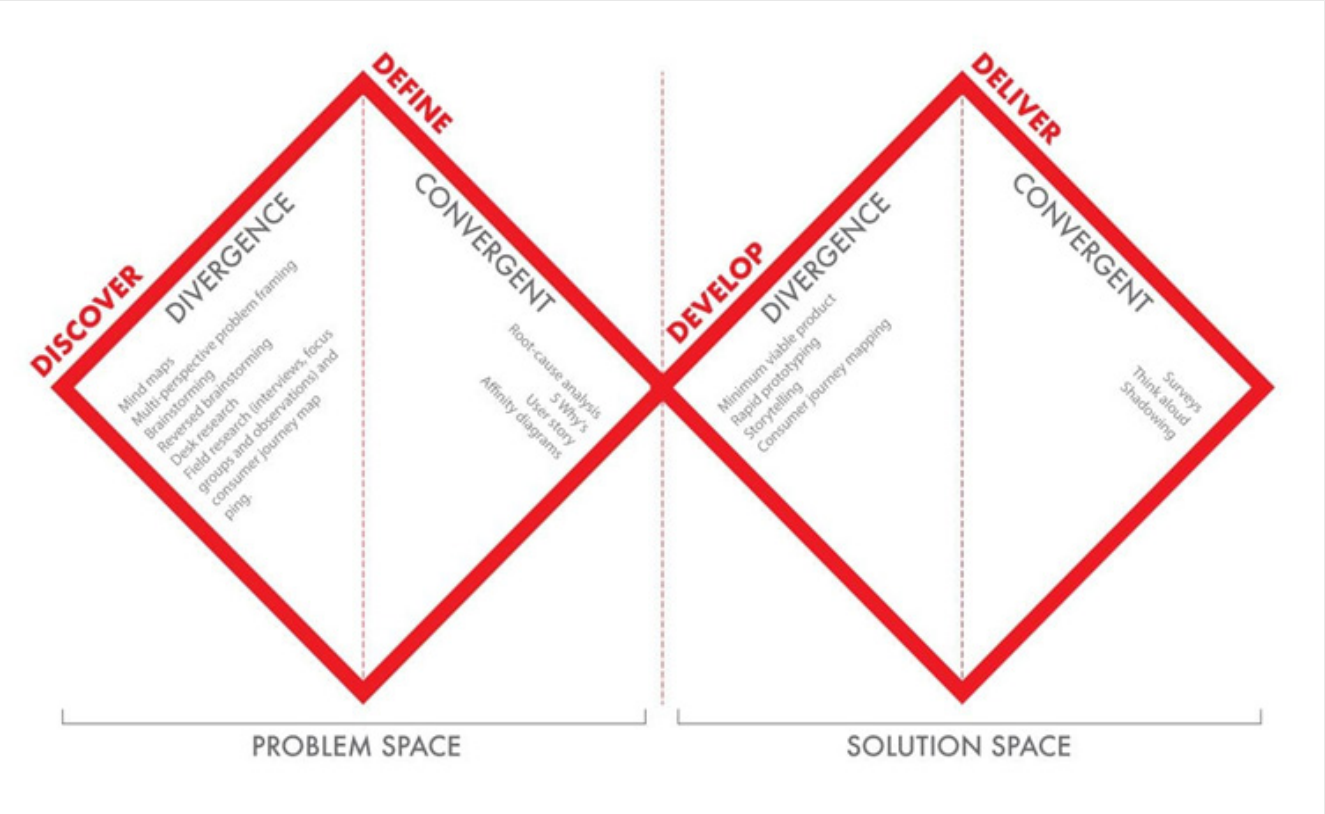


Figure 27: The double diamond design thinking process (Adopted from the Design Council). Elmansy R. 2021

A key aspect of the chosen design method was applying the findings to three separate sites at three scales. This meant individual problems and solutions could be recognised and applied to the research project. The purpose of this approach is to triangulate the findings.

Definition of Phases:

As illustrated in Figure 24, the research consists of four distinct phases. Phases 1 and 2 focus on establishing the research problem, and phases 3 and 4 concentrate on solutions.

Phase One involves the initiation of research, during which exploration and discovery of various sections, including potential sites and topics for the literature and precedent review, was undertaken to establish a foundation for the practice-based research.

Phase Two defines and develops the research discovered in Phase One by integrating design prototyping and creating conceptual ideations. The results of this phase are presented in the current chapter.

Phase Three is about developing the research gathered to construct three site-specific solutions and pushing towards a finalised design solution/s presented in part 2 of the research: The Design Overview Chapter.

Phase Four is concerned with the delivery of the integration and interpretation of the three site-specific design solutions created in Chapters Four and Five.

The concept of having four phases, split into two parts addressing the problem and solution separately structures and guides the design process, as it allows for data to be analysed and then used to inform the design decisions. Moreover, focused solutions can be created that address specific issues for the individual sites.

Implementation of Phase One in Design:

Phase One is the starting point for the entire research project. A controversy mapping (Figure 30) is a methodology used to explore and analyse complex socio-technical debates. The term "controversies" differentiates these intricate discussions from simpler debates where participants merely express their opinions (Machines, 2019). In Auckland's context, traffic and roads were used to create this mapping, which helped recognise issues from Chapter One at city-wide levels. A corridor mapping was made to split the issues into separate areas, helping combine issues. These maps are further developed in the Chapter Three: Design Project.

Implementation of Phase Two in Design:

Phase One identified suitable literature reviews and appropriate precedents to guide the research. The research was developed based on the findings of Phase One, and problem-based design solutions were created and supported by prototypes of design concepts from CAD models for Phase Two. This is further developed in the Chapter Design Project.

Implementation of Phase Three in Design:

Iterations of the TOD concept, walkable cities, and high-density corridors were tested in the Papatoetoe region, highlighting key areas for architectural intervention. Building on the previous research phases, the three selected sites that allow for establishing site-specific solutions would be based in Papatoetoe. CAD and massing models were made for the Papatoetoe Train Station and the suburban street design, demonstrating the selected sites' suitability. This is further developed in Chapter Three: Design Overview, under the heading Design Project, and Chapter Four: Design Proposition, under Site One.

Implementation of Phase Four in Design:

Phase Four draws on all completed phases to develop the final design solutions for their designated sites. The three site solutions are based on the research collected and address the problem of disconnected areas in Papatoetoe. This is further developed in Chapters Four and Five.

Combining two methodologies and curating a diagram from them creates a broader research approach that supports synthesising different types of information, scales, and processes underpinning creative projects. This allows for creative user-centred solutions to occur where an approach can be developed around evidence-based data, placing humans at the centre of designing and creating a solution that would positively impact the locals. Employing this method for the research allows for playful design concepts to be generated regarding existing data.

A review of literature and precedents underscores the importance of intermodal hubs in fostering connectivity, mixed-use development, and walkability. The following chapters build on these insights, applying them to the Papatoetoe context. The proposed design intervention explores how these principles can be spatially implemented to develop a more integrated and sustainable suburban transport network.

Part 1: Summary

Part One involved the design intervention in Papatoetoe and how it integrated three core principles: (1) walkability (15-minute city framework), (2) high-density mixed-use development (TOD principles), and (3) seamless multi-modal connectivity (Intermodal hub integration). These principles shape the proposed redesign of suburban streets and transit networks.

Part 2: Practical/Design

Part Two will apply the research findings to build upon the foundations to form the design solutions.

Chapter Three: Design Overview

The second part of the design discussion primarily centres on the design choices informed by the theory. As mentioned in the previous chapters, Chapter One and Chapter Two, working at different scales, enables a transformative and interlinked design approach (Figure 24). This research works at three scales and sites, all working together to create a transport network system.

Design Project

The following writing establishes the design project by analysing traffic patterns and mapping data to determine areas needing architectural intervention. Supported with CAD models to remedy the issues from the data collected, which would help determine suitable sites for the research.

Figure 28 presents a distance mapping of Papatoetoe. This was created to show access to local amenities and services from a fixed point. As a base model, the location was fixed to my house, which created distances to main amenities that exceeded 4500 metres. This meant access to essential amenities was more significant than a 15-minute walkable distance, and a solution needed to be implemented.

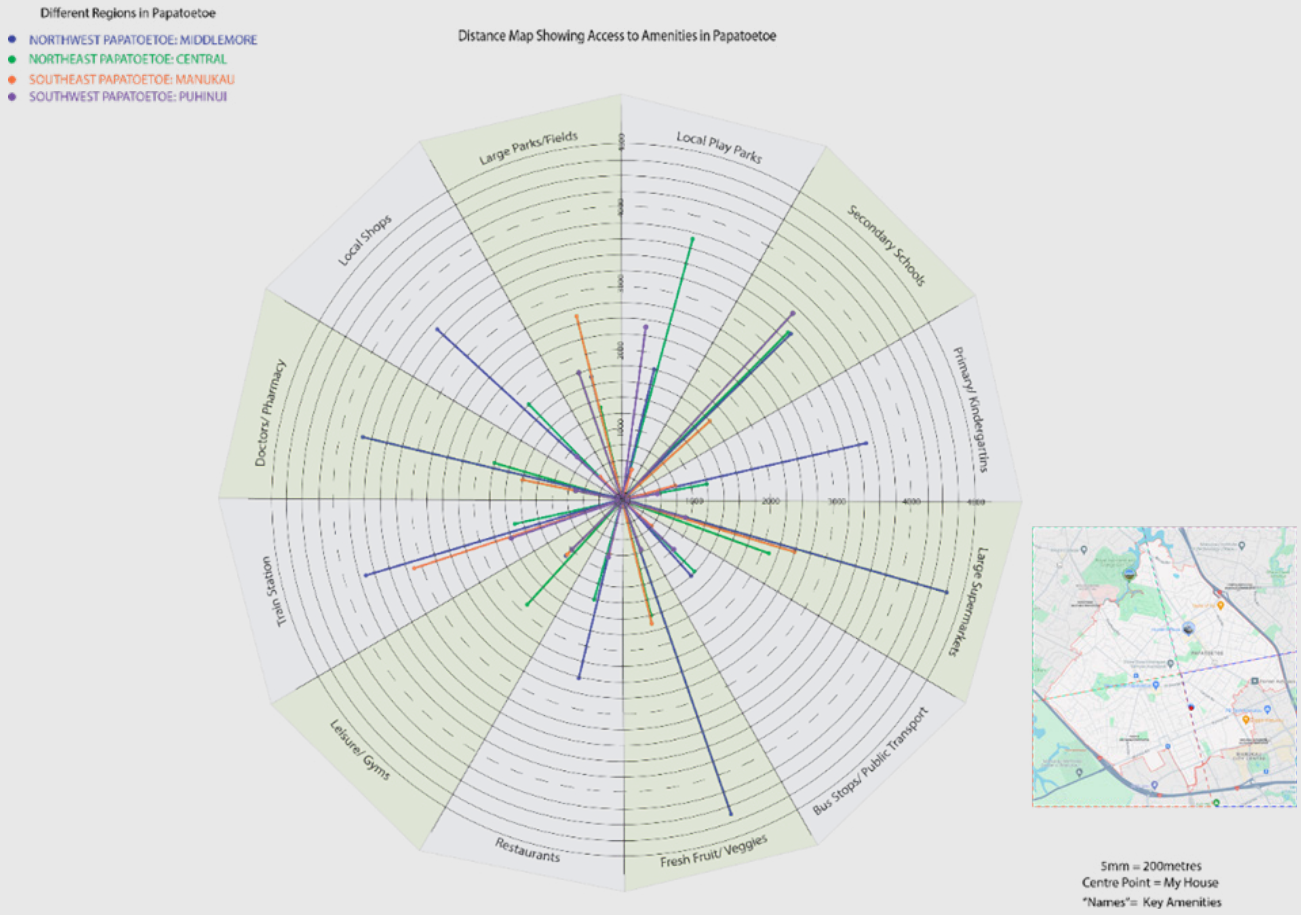


Figure 28: Distance mapping created to highlight access to amenities is low in Papatoetoe supported with a split Papatoetoe to show how the regions were measured. 2024.

Phase Two is about defining and developing: Figure 29 presents the matrix mapping created, which shows potential topics that would be taken into the research and developed in Part Two: Chapter Three: Design Chapters. The matrix hosted a range of ideas, which were compared with each other to see if they worked or not. Spaces where they did not work were left blank and were considered as gaps. With this, topics could be combined, and solutions for potential sites could be designed without taking too much time.

Matrix Mapping

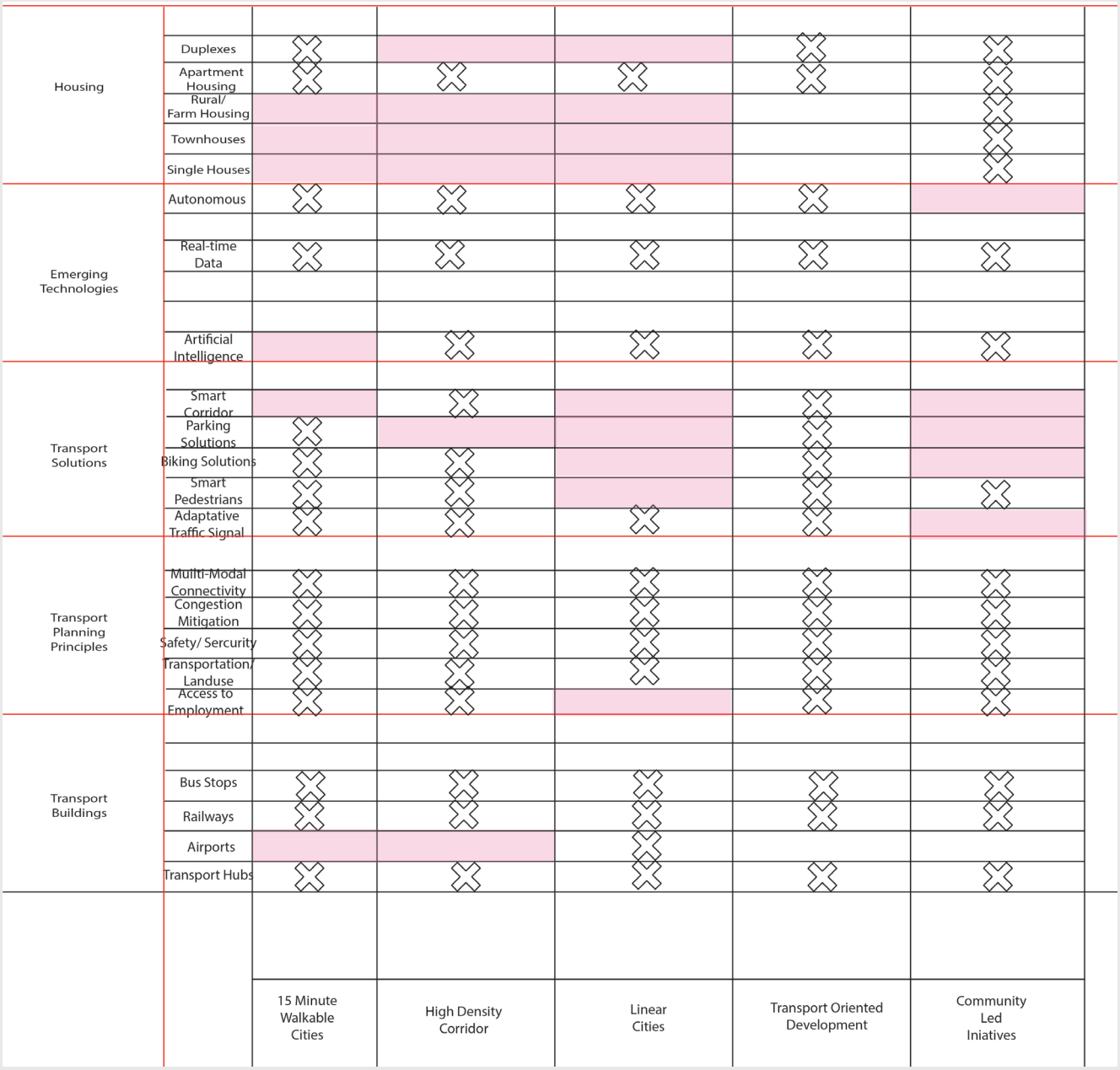


Figure 29: Matrix mapping consisting of a range of topics with gaps highlighted for potential design solution implementation. 2025.

15-minute walkable cities, high-density corridors, and TOD were identified as key design drivers that served as a framework for potential transport network-based solutions, as these had the least gaps in the matrix (Figure 29).

Controversy Mapping

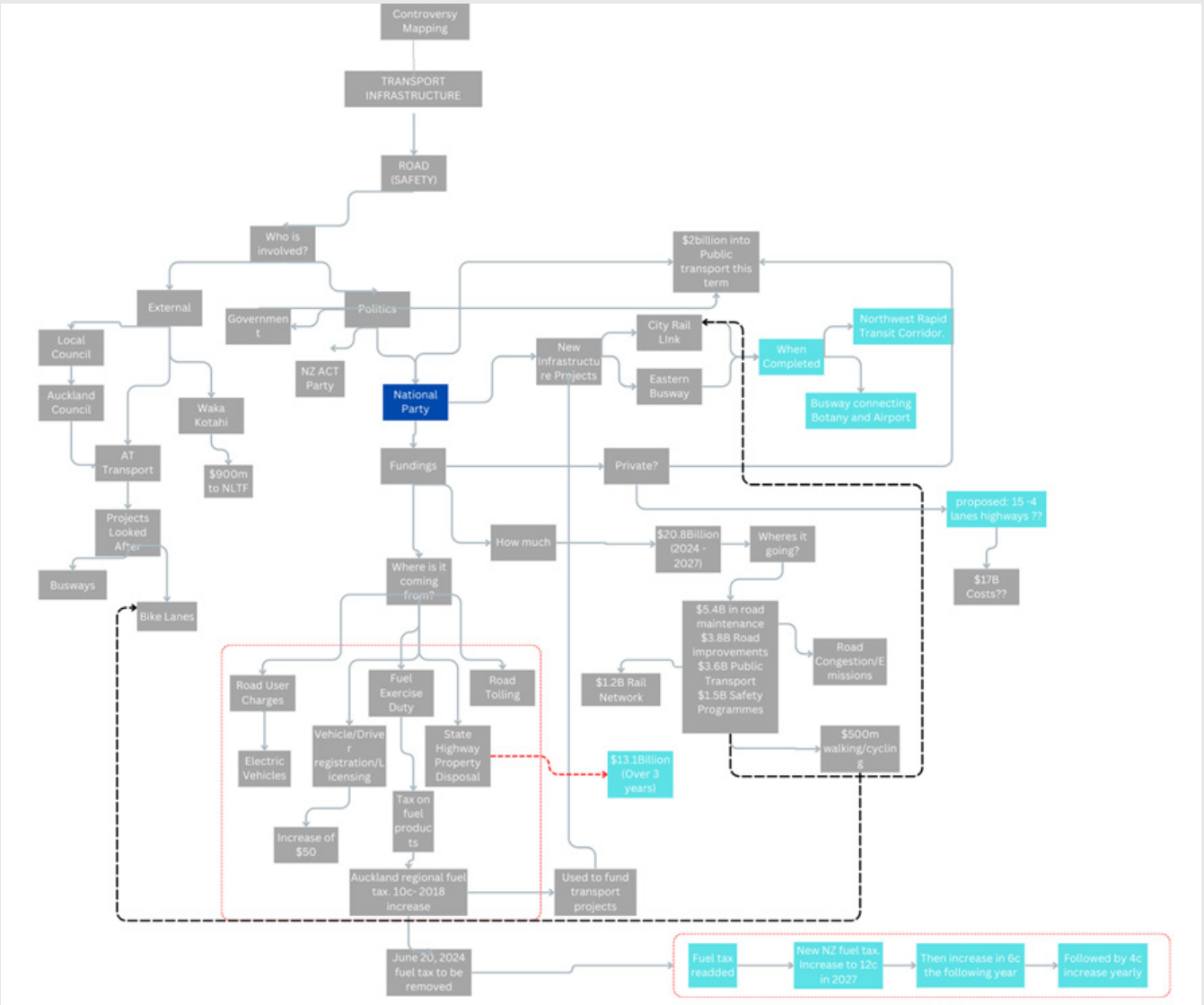


Figure 30: Diagram showing the political data collected to create a controversy mapping regarding transport infrastructure. (RED outline is Labours Party's Plans. Blue is National Party's plans). 2024.

Next, a controversy map (Figure 30) was created, highlighting the issues around roads and traffic in Auckland.

Figure 30 shows a wide range of research highlighting key issues and transport infrastructure problems that emerged as the main ideas were collected from various news articles and blogs (Stuff, 2024; 1News, 2024; Greater Auckland, 2024; Radio New Zealand, 2024). This helped direct the research into a transport network project that worked at different scales. The goal was to start small in a familiar region requiring an urban and suburban retrofit.

Data was retrieved from Auckland Transport's open databases and news articles to evaluate, analyse, and implement various strategies across different sites, serving as a controlled benchmark for identifying the potential advantages and disadvantages and determining which site would perform best for the design application. This included traffic reports and busy pedestrian spaces (Figure 31) (Auckland Transport, 2025).

Figures (31 and 32) show the traffic count in Papatoetoe from 2017 to 2029 (Auckland Transport, 2021). It is clearly shown how traffic will increase within this suburb in the future, and design solutions need to work alongside this to mitigate this issue.

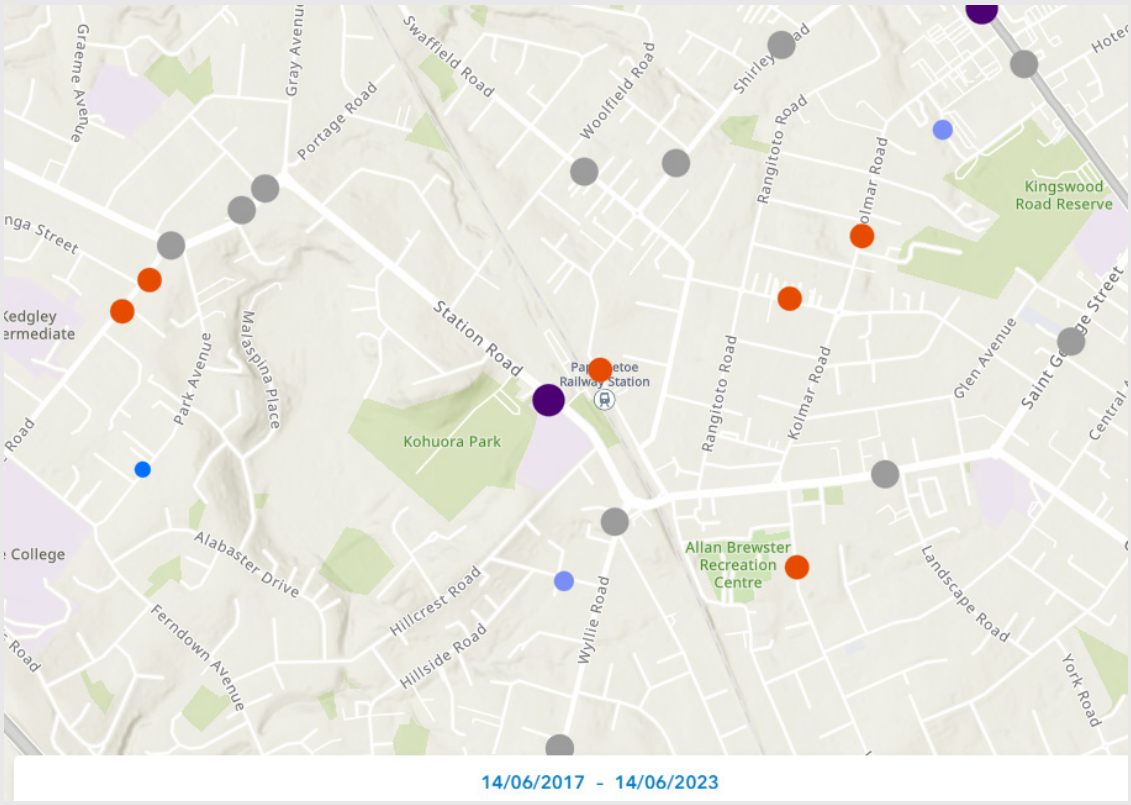


Figure 31: Average daily traffic counts mapped in Papatoetoe from 2017 to 2023. Auckland Transport Open GIS Data. 2021

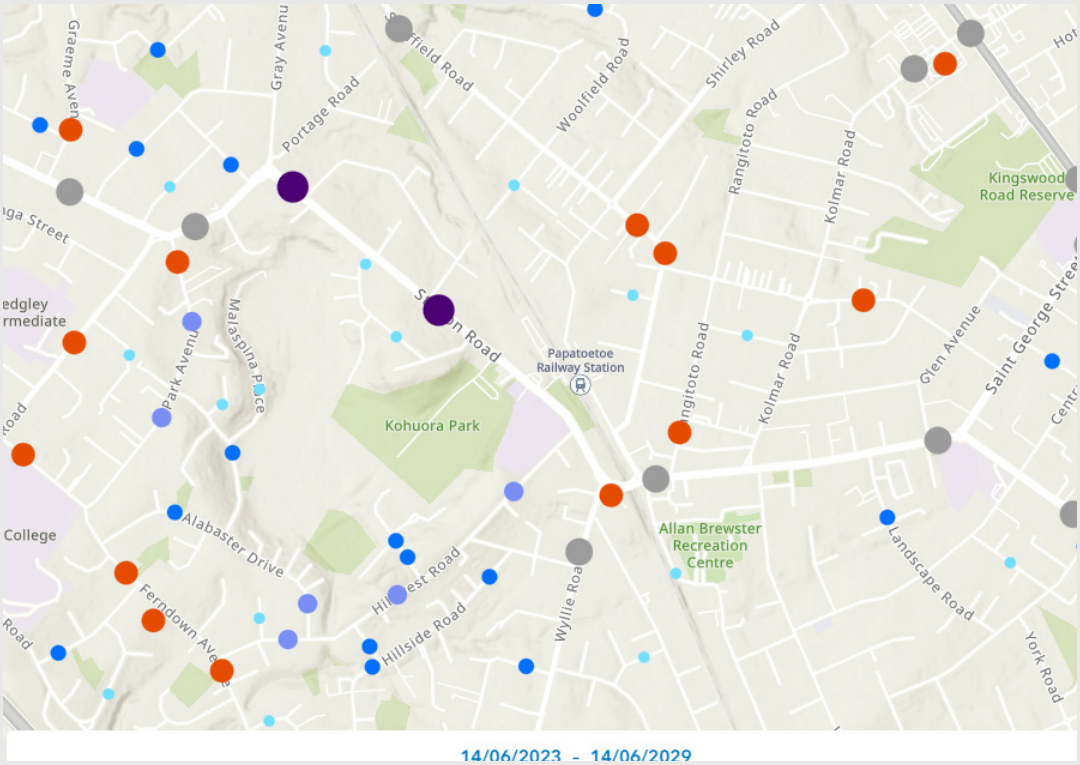


Figure 32: Average future daily traffic counts mapped in Papatoetoe from 2023 to 2029. Auckland Transport Open GIS Data. 2021

Roads and streets serve different roles based on surrounding land use (Place) and the transportation modes they support (Movement) (Auckland Transport, 2025).

Place Function: Represents how a road or street serves as a destination, considering how far and how many people or goods travel there.

Movement Function: Reßects the road's importance in the transport system and the volume of users across different travel modes, as deÞned by AT's Future Connect Network Plan. Combining three levels of Place and Movement signiÞcance, the framework identiÞes nine possible street and road types across Auckland (Auckland Transport, 2025).

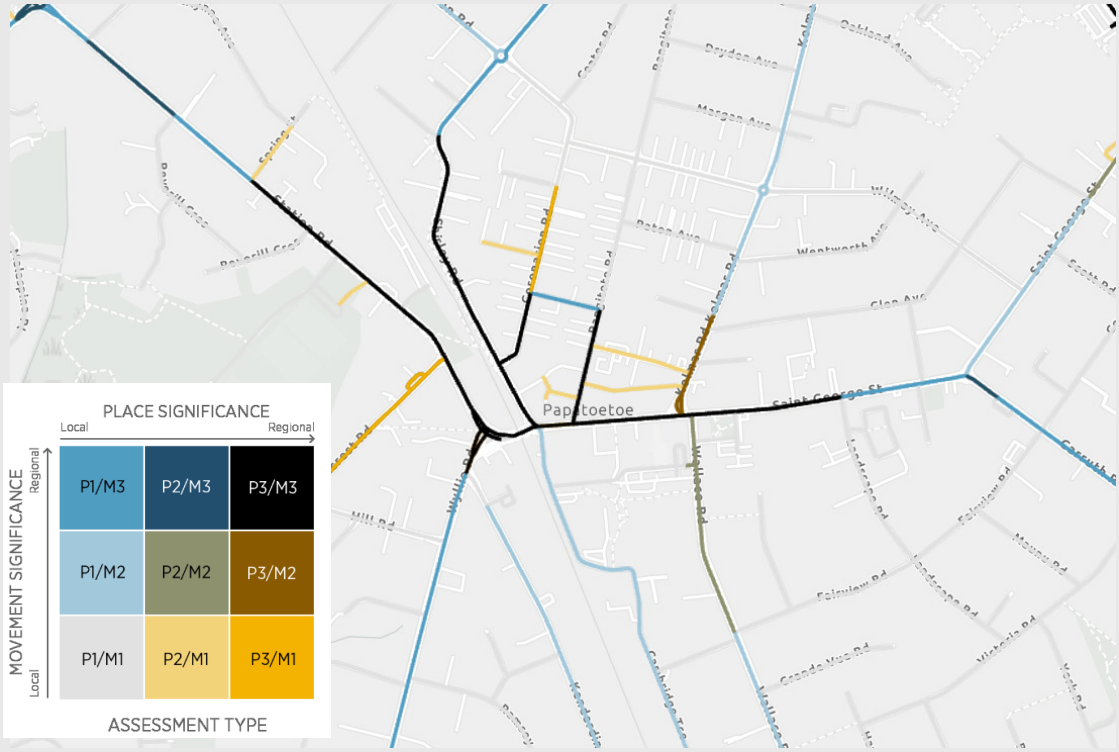


Figure 33: Mapping showing high movement and high place area in Papatoetoe, outlining a TOD corridor for future plans. ©Auckland Transport. 2025

Auckland Corridors and Nodes

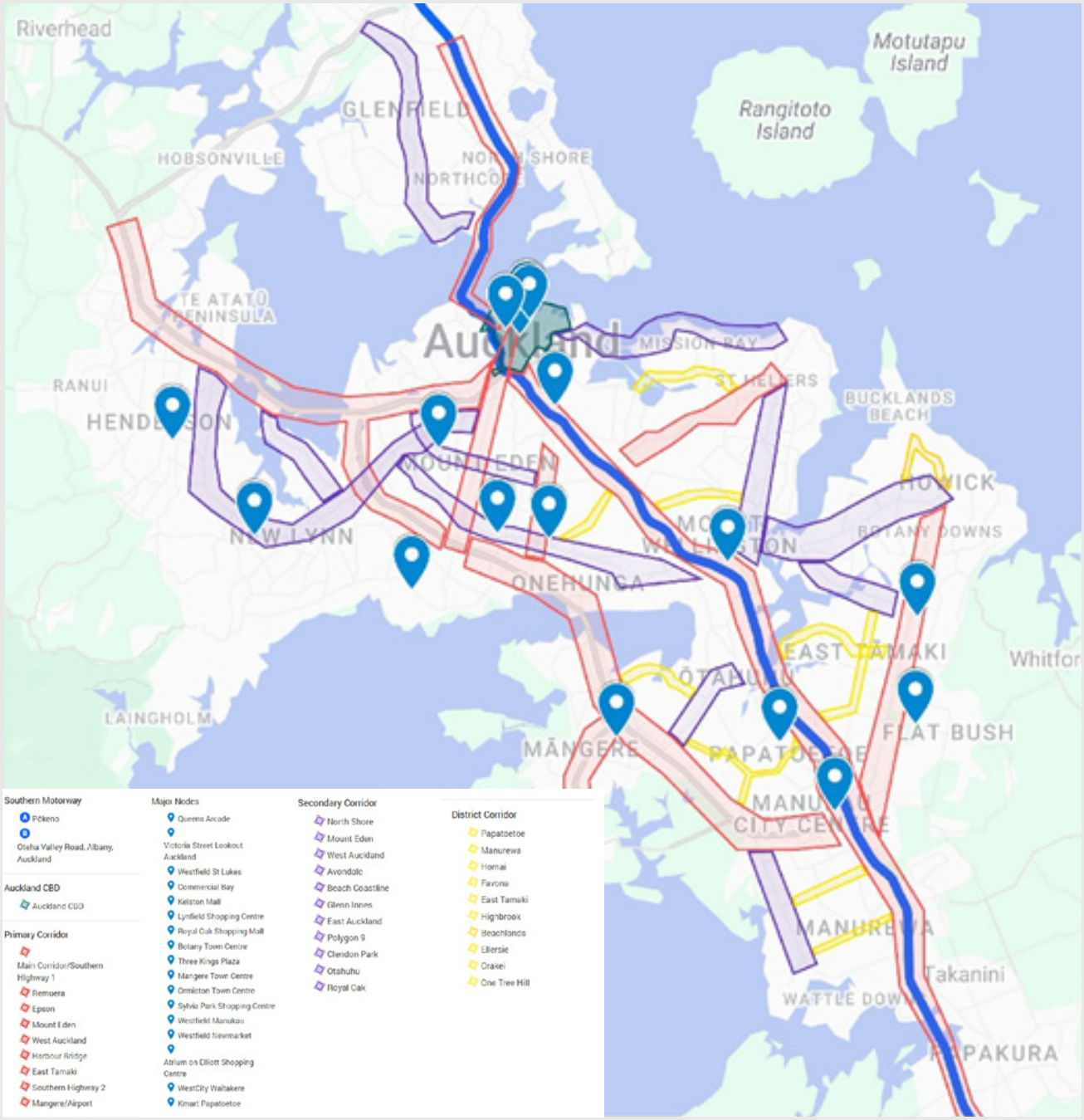


Figure 34: Mapping showing Auckland's corridors and nodes identifying key areas for TOD design implementation. 2025.

Figure 34 shows Auckland's transport corridors, which can be used as potential sites for the research. By identifying these corridors, I could understand this project's scalability. Any design solution would result in a connected Auckland.

Auckland CAD Model

Figure 35: CAD model of Auckland regional areas implemented with potential regional hubs. 2024

Figure 35 shows a proposed concept of introducing hubs in every region, creating a wider connected Auckland. With the CAD model started it was possible to reflect upon and evaluate my design decisions, which helped me advance the research to the next phase. Visualising the hubs was a first step that offered a general idea of the problem that could be used to develop more precise solutions for individual hubs.

Auckland Traffic Mapping

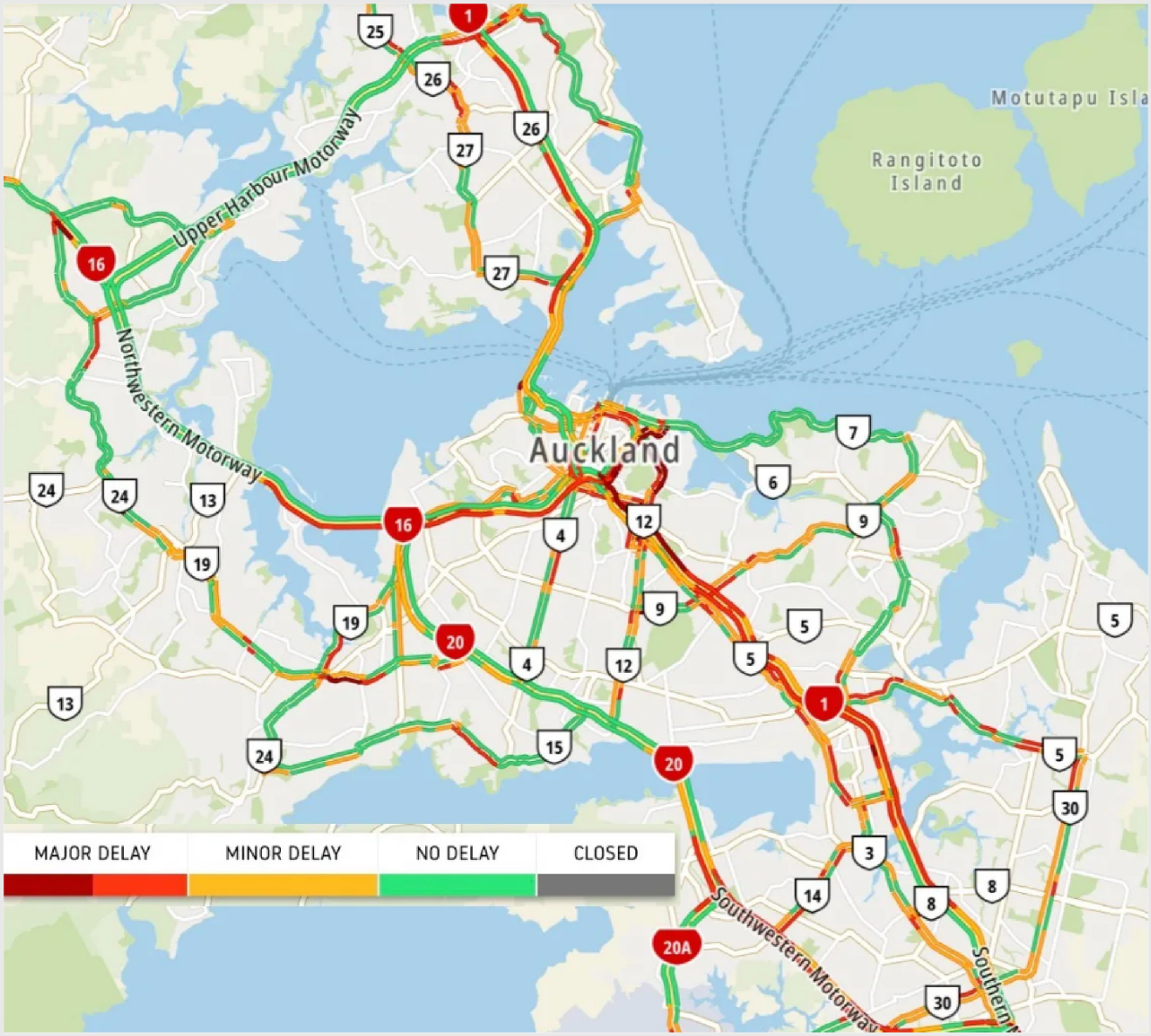


Figure 36: A major traffic problem from Newmarket to Mount Wellington during peak rush hour. Tomtom. 2025

Figure 36 illustrates Auckland's extensive traffic problem, viewed through the transport-oriented corridor, which is one of the main issues this research aims to address.

Auckland Density Mapping

Figure 36 illustrates Auckland's extensive traffic problem, viewed through the transport-oriented corridor, which is one of the main issues this research aims to address.

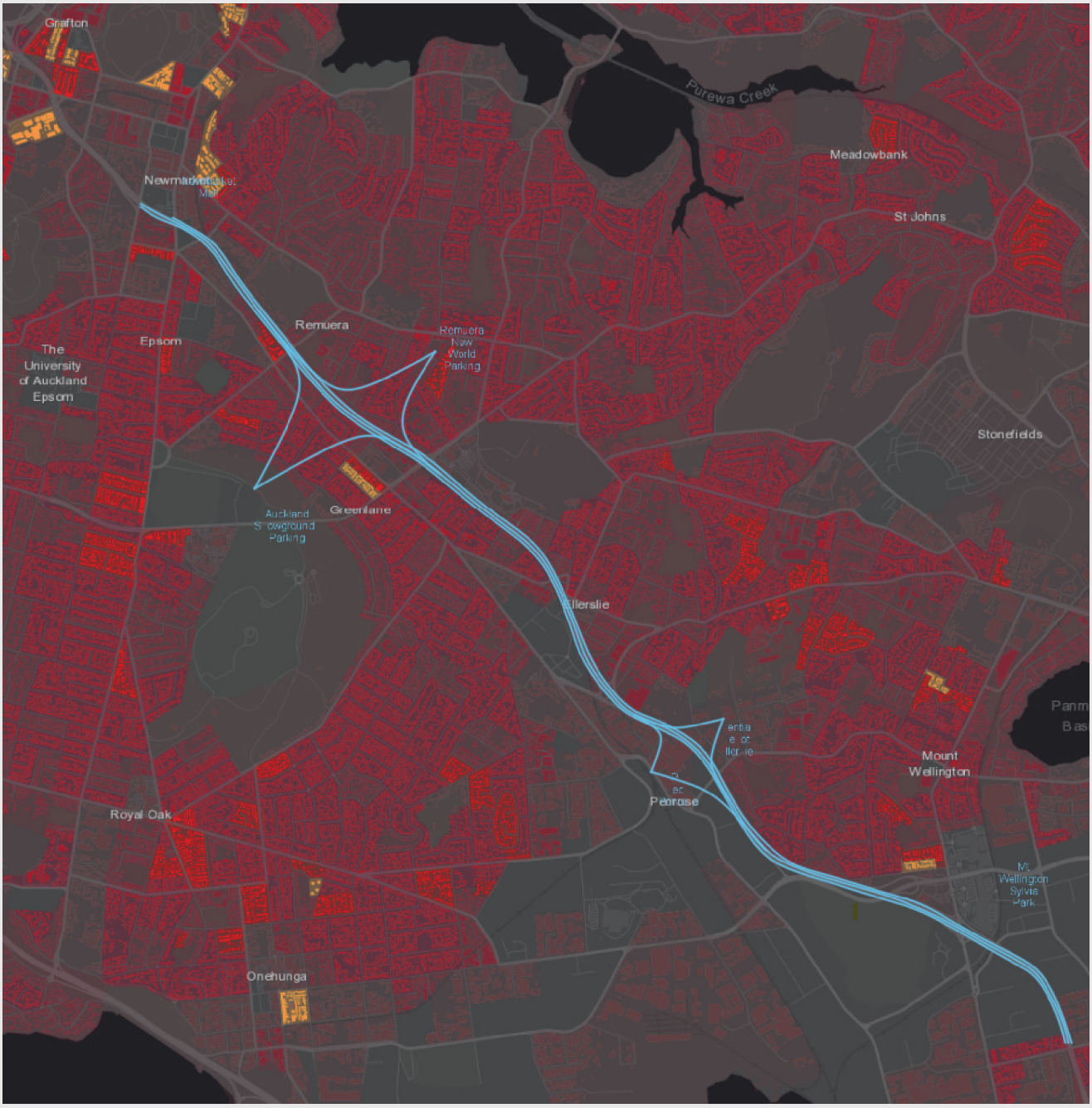


Figure 37: Density mapping of Newmarket and Mount Wellington with a possible design solution. 2024

Auckland CAD Model: Track Hub

Figure 38 presents a conceptual design model of a hub that could be implemented in Newmarket. The model hub allows cars to drive inside and board onto the carriages that will use the track system to go over the traffic to other hubs connected with the track, minimising cars on the road and reducing traffic. Multiple cars could be boarded on the carriages, and multiple carriages would be in rotation; after dropping the cars off at other similar hubs, they would return and repeat.

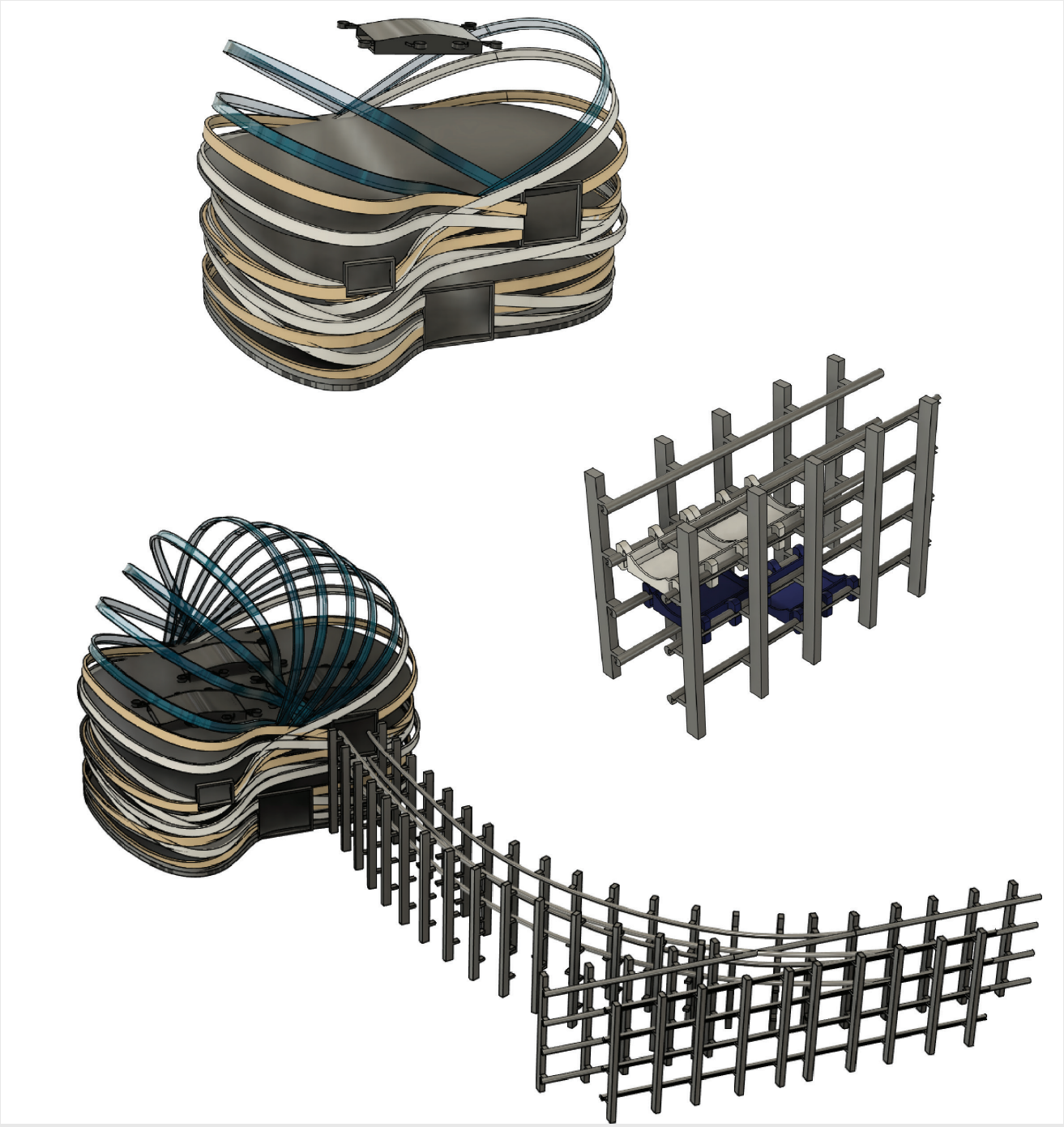


Figure 38: CAD model a of hub with the track system implemented as a potential solution. 2024.

Figure 38 presents one of the first concepts for a transport hub; the track system removed cars from the roads and allowed users to use their cars still but not create carbon emissions.

Concept Hub Design

Phase Threes introduces the first step in the design development, which was the establishment of 15-minute cities along a high-density corridor along the Papatoetoe train line (Further developed in the Site Analysis heading). Figure 39 starts concepts through drawings and the Revit model.

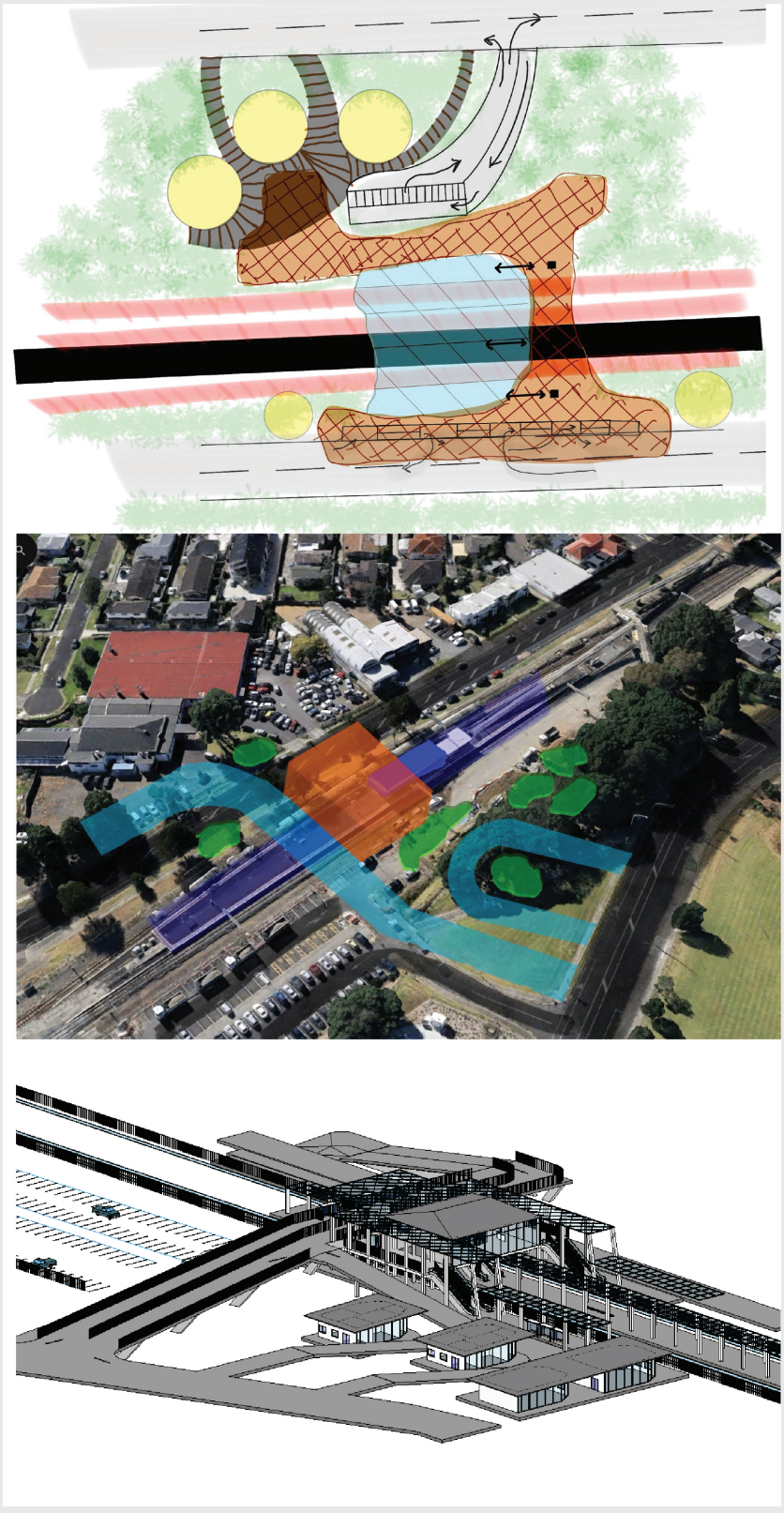


Figure 39: Image of first design concept then placed on Papatoetoe train station to the creation of the CAD model of the hub. 2024

Concept Street Design

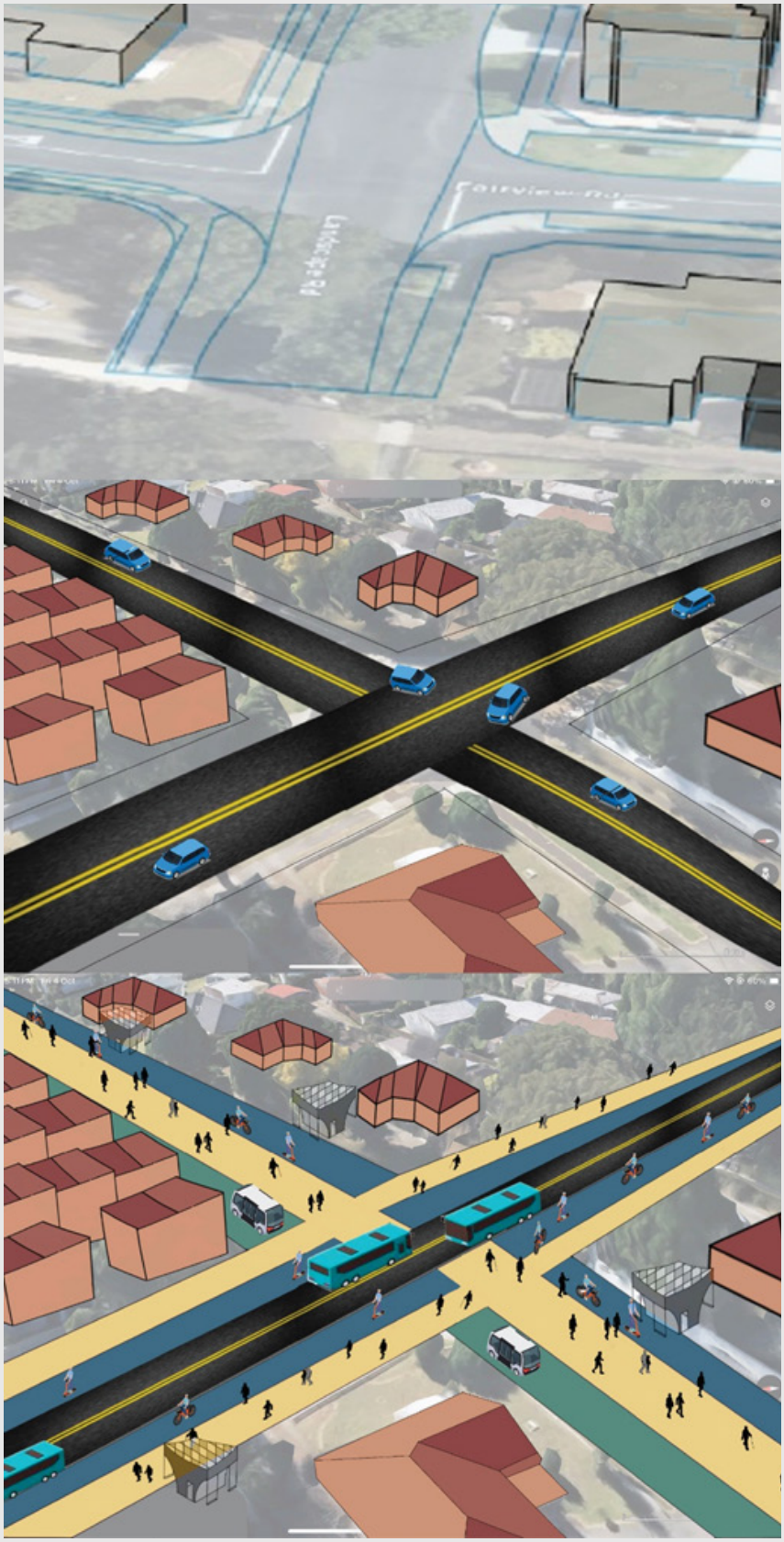


Figure 40: Massing CAD models and drawings showing existing layout with purposed street layout. 2024

Figure 40 presents street massing and concept drawings on a local street in Papatoetoe, bringing the idea of walkability to the spaces. (Developed further in Chapter Four: Design Proposition)

Site Analysis

The nature of the current study required three separate sites at three different scales. One site was used for the hub, one to depict the suburban street, and another to implement the urban street design and illustrate how it connects with the hub. To ascertain this, a range of testing was undertaken to identify suitable sites, examining factors such as density, location, and overall viability of the space.

As a starting point, potential 15-minute city circle radii were drawn around four easily accessible train stations in the Papatoetoe, Mangere, and Manukau regions: Papatoetoe Train Station, Puhinui Train Station, Middlemore Train Station, and Manukau Train Station (Figure 41). With this, we could determine possible areas for site selection.

Figure 41: Mapping of 15-minute cities in context of the South Auckland and four major train stations. Google maps. 2025

Site One: Suburban Area: Papatoetoe Region Transport Network

The insights gained from the literature and precedent review, together with the mapping (Figure 32), show that a design strategy implemented at an Auckland-wide level would require advanced research and testing before a solution could be presented. Developing a particular area like Papatoetoe is highly likely to result in a design solution as it is in the centre of the four train stations and requires an upgrade. Papatoetoe station also has building land and was chosen because of its accessibility, as this is where I reside and, therefore, have knowledge of the general area. With this in mind, other sites were researched but were not chosen as they required further research, going beyond the scope of work.

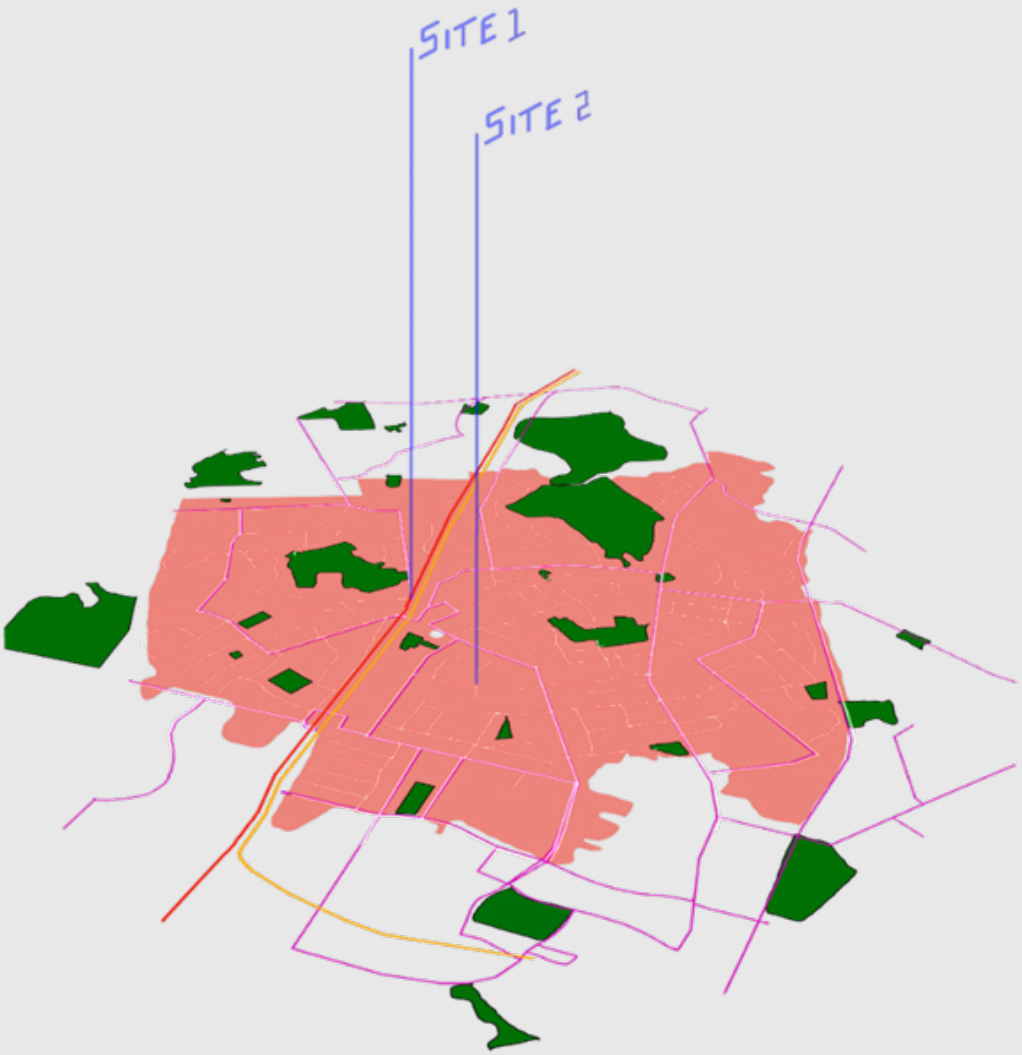


Figure 42: Papatoetoe region with the two sites placed inside. 2024

Figure 42 presents a map of the Papatoetoe region (light red) that features the hub and street sites. This mapping also captures bus (pink lines) and train routes (Orange and red lines) and urban greenery (shown in green colour).
Within the vicinity of the site are various bus stops that provide public access to the train station.

These bus stops serve seven different routes that connect most of Papatoetoe. Papatoetoe is a well-established suburb that offers a blend of residential, commercial, recreational, and places of worship, all within a five-minute walk from the train station. Across the area and throughout Papatoetoe, various pedestrian pathways and cycle lanes ensure safe walking and cycling for users.

The Old Papatoetoe town centre, located a short walk from the train station, offers space to various retailers, supermarkets, and service shops, with Eke Panuku- "…council-controlled organisation that delivers urban regeneration in Tamaki Makaurau" working on revitalisation efforts to improve street safety and public spaces (Eke Panuku, 2024). The community is well-served, with schools, parks, and the Allen Brewster Leisure Centre that can host various sports events (Auckland Council, 2024). Environmentally, the transition to electric trains since 2014 has reduced carbon emissions and noise pollution while promoting public transport usage (Auckland Transport, 2024). Culturally, Papatoetoe is diverse, home to various ethnic groups, including Indian, Māori, and Pacifica families, with the train station providing easy access to local worship sites and community centres.

GRAPH TABLE METADATA

Ethnic groups for people in Papatoetoe Central and Auckland Region, 2018 Census

Category	Papatoetoe Central (%)	Auckland Region (%)
European	25.6	53.5
Māori	10.3	11.5
Pacific peoples	16.5	15.5
Asian	56.6	28.2
Middle Eastern/Latin American/African	1.4	2.3
Other ethnicity	0.6	1.1

Table 1: showing different ethnic groups in Papatoetoe Central in 2018. Retrieved from Stats. Stats.nz. 2025

While Table 1 above only features data on the ethnic groups in one of the nine regions, it still clearly indicates how diverse Papatoetoe is. We can work with this information.

Site Two: Papatoetoe Intermodal Hub

The chosen site was the current Papatoetoe Train Station. Puhinui Station has recently been developed and is now open to the public, and construction has begun at Middlemore Station. On the other hand, Papatoetoe station has not been developed since 1996, when the original station building was removed (Crow, n.d.), suggesting that it desperately needs a transformation. Following the accounts of the chosen approach that combines transport-oriented development with high density, the first step in the design process would be identifying areas for the corridors where an urban retrofit could occur. By combining transport-oriented development (TOD) with potential high-density zones and aligning them with matrix mapping and controversy mapping requirements, the time taken to narrow down potential sites was reduced.

Based on these outcomes, focusing on key transport networks through Papatoetoe was possible, resulting in two scenarios for site one. Option A would involve redeveloping the Papatoetoe Train Station, while option B would involve locating an empty lot near bus and train routes.

Figure 43: Current Papatoetoe train station. (Labelled in blue) Google Earth. 2024

Figure 43 (marked by the blue spot) shows the existing train platform chosen as the site for the intermodal hub design. Papatoetoe Train Station is a key transport hub in Auckland, connecting the airport, East, South, West, and Central Auckland. It is positioned between Middlemore and Puhinui stations and features a modern curved island platform with a single entry point accessible via two onramps. This ensures usability for all, including wheelchair users; however, the station currently lacks elevators. AT Hop card and ticket scanners, a ticket machine, clear signage, and a monitored customer service room support security and convenience. The station has three tracks—two active for services to Britomart, Manukau, and Papakura, and one under construction for the City Rail Link, set to enhance service frequency in 2026. Travel time to Britomart is approximately 30–35 minutes. On-site, a bike storage unit makes it possible for users if they want to store their bicycles when using the train. This train station also offers ample parking for those who wish to park and ride, allowing residents to drive in, park, and take the train.

Site Three: Suburban Street: Landscape and Fairview Intersection

Site three was placed on the boundary of the potential 15-minute city radii, which created a zone to focus on for the design solution for local streets. A wider main road - Landscape Road, with an intersecting, smaller Fairview Road - was selected. This site was chosen due to the variety of nearby housing, including double-storey houses, apartment housing, connected townhouses, and single-story detached houses with large land areas. The minor road features substantial grass berms and single-story detached homes. Congestion was a significant issue on these roads; therefore, a design intervention would enhance the area and contribute to a broader transport network solution.

Figure 44: Photographs showing Fairview Road. 2025

Figure 44 shows the site Fairview Intersection from both sides aligned with cars parked on the grass berms.

Figure 45 shows the main road intersecting with Fairview Road, which is filled with trees, a wide road, and narrow pathways

Figure 45: Photograph of Landscape Road showing the wide road and trees. 2025

Historical Background

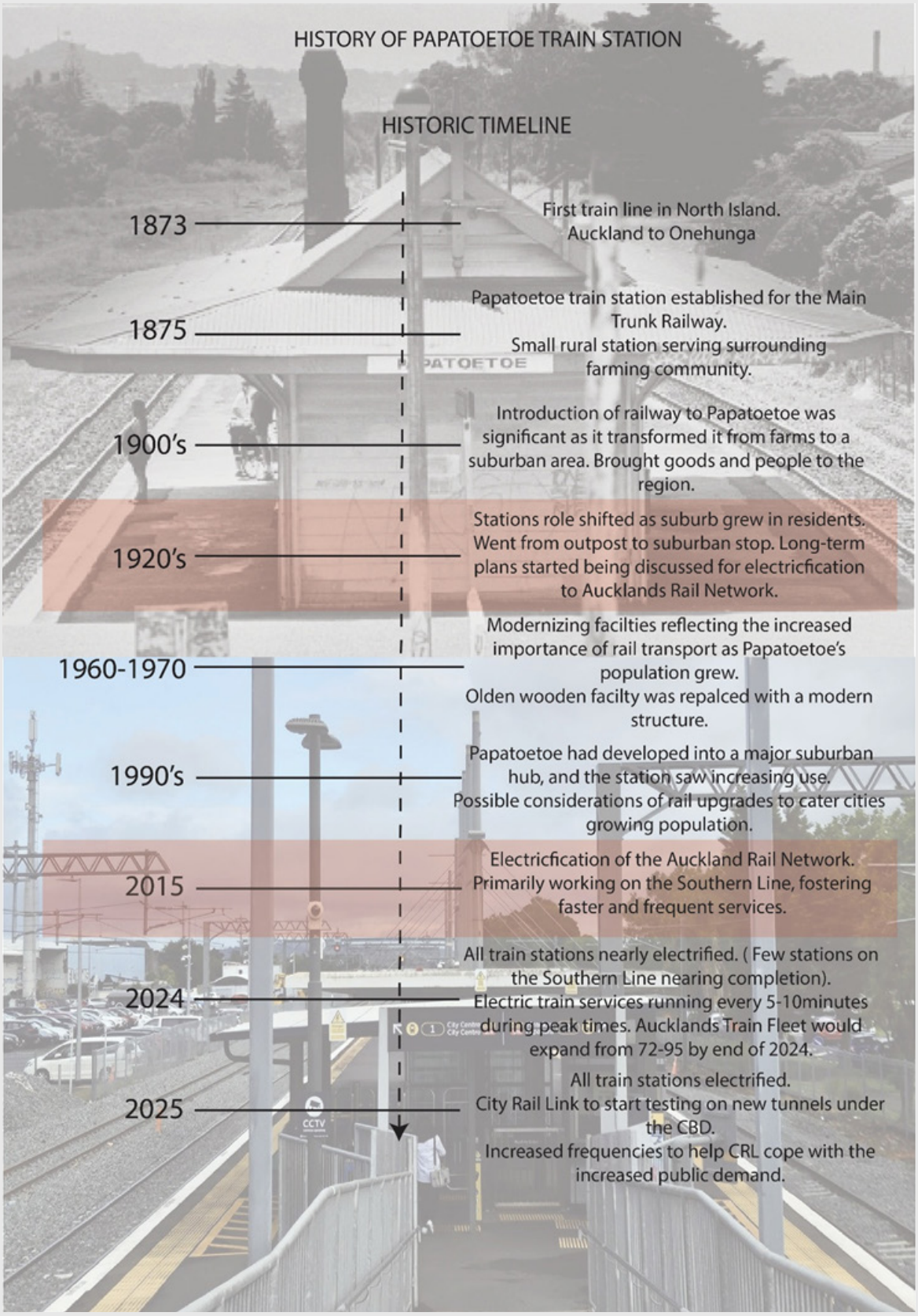


Figure 46: The history timeline of Papatoetoe Station shows the past and present. 2025.

Figure 46 concisely describes Papatoetoe station's past and plans. Notably, discussions on electrifying the Auckland rail network commenced as early as 1920, with actual construction commencing only in 2015. Figure 46 includes two images; the first illustrates the old train station building, which has been transformed into a café and relocated 100 metres south of its original position. The former train station featured two railway track lines, which have persisted into modern times. The current layout of the station depicted in the second image resembles less of a building and more of a covered area situated on the former curved platform. These two images show that Papatoetoe has not undergone a design intervention to enhance this station in over 30 years. With the introduction of the intermodal transport hub, significant changes can be expected to this space, which would enhance this station and improve the surrounding area. This would promote growth and connectivity among residents.

Sites Opportunities and Constraints

Papatoetoe is a central site with bus and train connections to most of Auckland. Utilising this site for the project means those connections must be integrated into this intermodal hub. Papatoetoe is easily accessible for photography and site research. Drawing on my local area knowledge, I can create a design solution that positively impacts the residents.

There are distinct opportunities and constraints for all three locations: Papatoetoe Train Station, Papatoetoe Region, and the Landscape & Fairview Road intersection, which will be examined further below. For Papatoetoe Train Station, a significant constraint is the limited space available to construct a hub without impacting access to the surrounding streets used by buses, trucks, and private vehicles. This construction could delay or restrict access, affecting local Papatoetoe businesses and those throughout Auckland. Another constraint for the train station is that designing across railway tracks does not enhance safety and could lead to accidents. This issue will be addressed in Chapter Four: Design Proposition.

Development of the Papatoetoe region is restricted by the council guidelines mandating low-density housing in the areas surrounding the TODs. Due to this constraint, a change to the current urban zoning structure is needed to enable high-density development.
Moreover, the current low-density population may mean the proposed transport network would not be utilised. Development of the Landscape and Fairview Road intersection depends on accessing under-utilised land. The addition of parking reduces access to Fairview Road and limits access for vehicles turning onto the dual carriageway.

Ecological, climate, and cultural factors were considered and would need to be addressed as part of a real-world project. However, these issues are beyond the scope of this research and were therefore not further explored.

Design Overview Summary

Overall, Papatoetoe is an excellent site for trialling different architectural design interventions because of its rich history and cultural diversity. However, because of the region, implementing city-level urban interventions may complicate matters as they require other inventions to occur first, and then new additions can be trailed.

Chapter Four: Design Proposition

The following chapter works through the design proposition for the research. It introduces the three sites with the specific site solutions, all incorporated into Papatoetoe's context. The Papatoetoe region mapping is done on a 1:7000 scale, and the Papatoetoe Intermodal Hub floor plans are shown on a 1:500 scale. Finally, as exemplified by the Landscape and Fairview Roads Intersection, the suburban street is represented with a floor plan at 1:200. Lastly, the multi-modal mapping captures different modes of transport and times taken to travel 1500m.


Contextual Mapping:

This mapping (Figure 47) was created to provide context for Papatoetoe as viewed through various modes of transport. It highlights areas such as the different housing types near the train station, the available amenities, and their distances. With this information, it was possible to determine what should be offered on the streets and in the hub. Various details were mapped, including hospitals, doctors, food and vegetable shops, and local restaurants in Papatoetoe.

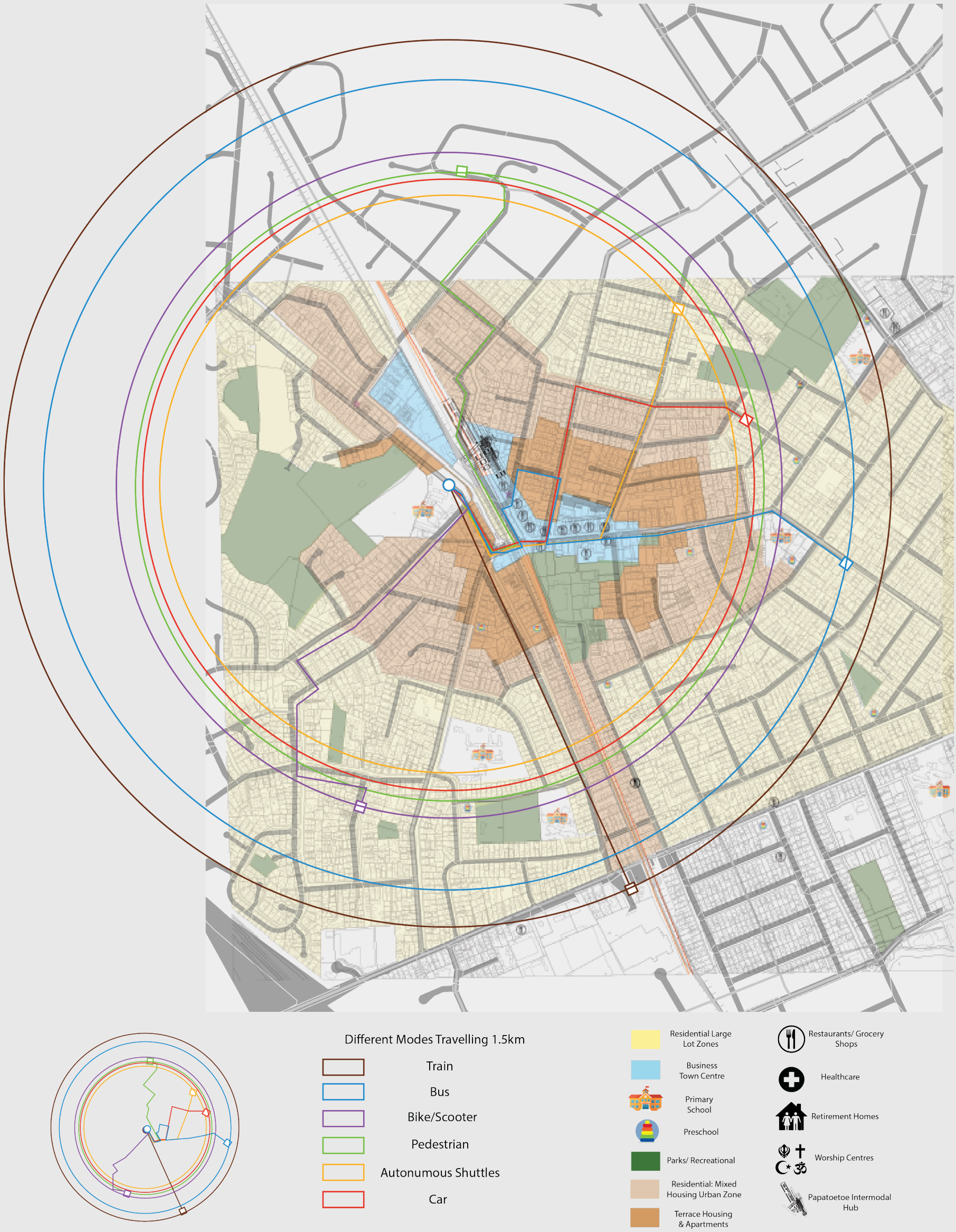


Figure 47: Mapping showing multi-modes of transport going through Papatoetoe with context. 2025.

Site One: Papatoetoe Region Mapping: Transport Network

Site 1 is a 1:7000 scale map that shows the transport network for the South Auckland area, primarily Papatoetoe (Figure 48).

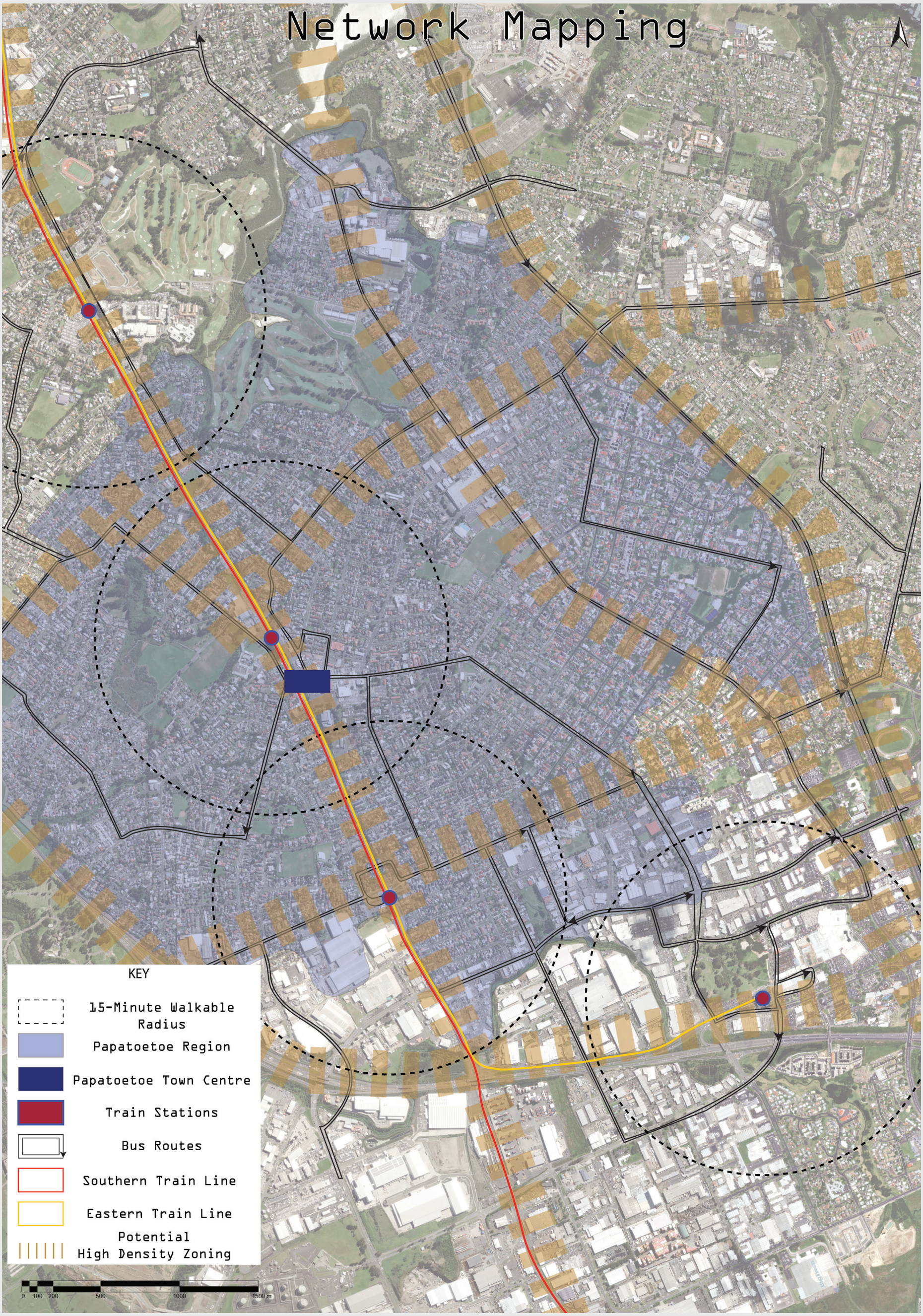


Figure 48: Network mapping of Papatoetoe showing bus and train routes. 2025

The network mapping (Figure 48) includes several important components on the map (labelled with keys); a significant observation from this mapping is the potential for high-density zoning around transit-oriented developments (TOD) (labelled in orange stripes). One key understanding to highlight is the accessibility of suburban areas to bus routes; in some cases, certain suburban middle areas may be quite far from a bus stop. In a worst-case scenario, it could take up to 10 to 15 minutes to walk to the nearest bus stop, which may limit public transport options for residents living farther away. If the laws around the building or when get more interesting, more people will occupy the better-designed spaces.

Site Two: Papatoetoe Intermodal Hub

The intermodal transport hub serves as the focal point of the research. The hub aims to provide users with a transport system with access to amenities while also allowing residents of surrounding communities to enjoy these services. It is meant to be a connection point for Papatoetoe and a central waypoint for Auckland. There are no drop-off points in the current layout of the station or bike or scooter lanes.

Figure 49 shows shared pathways between cyclists and pedestrians.

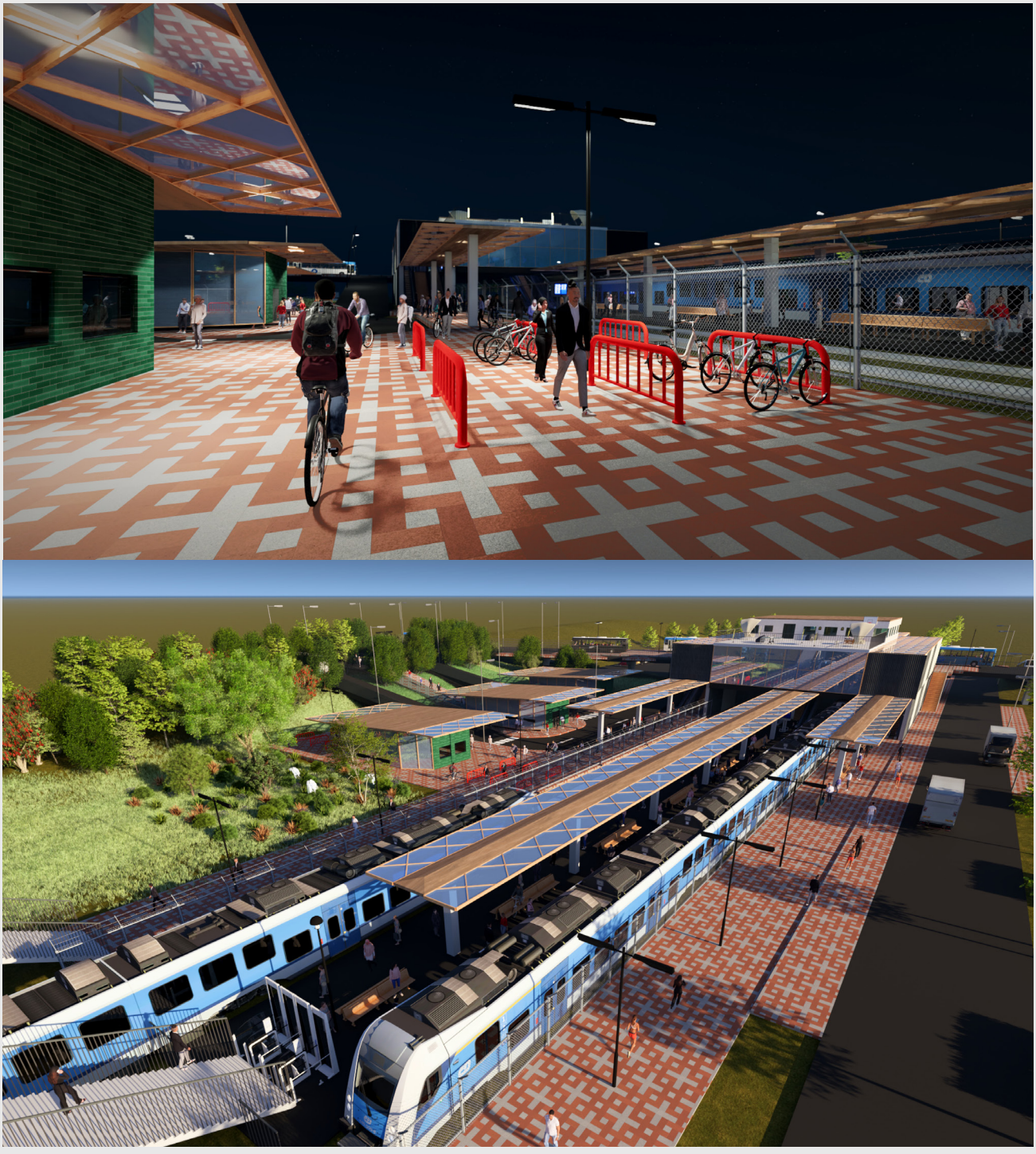


Figure 49: Renders of the Intermodal hub, highlighting the pedestrian footpaths. 2025.

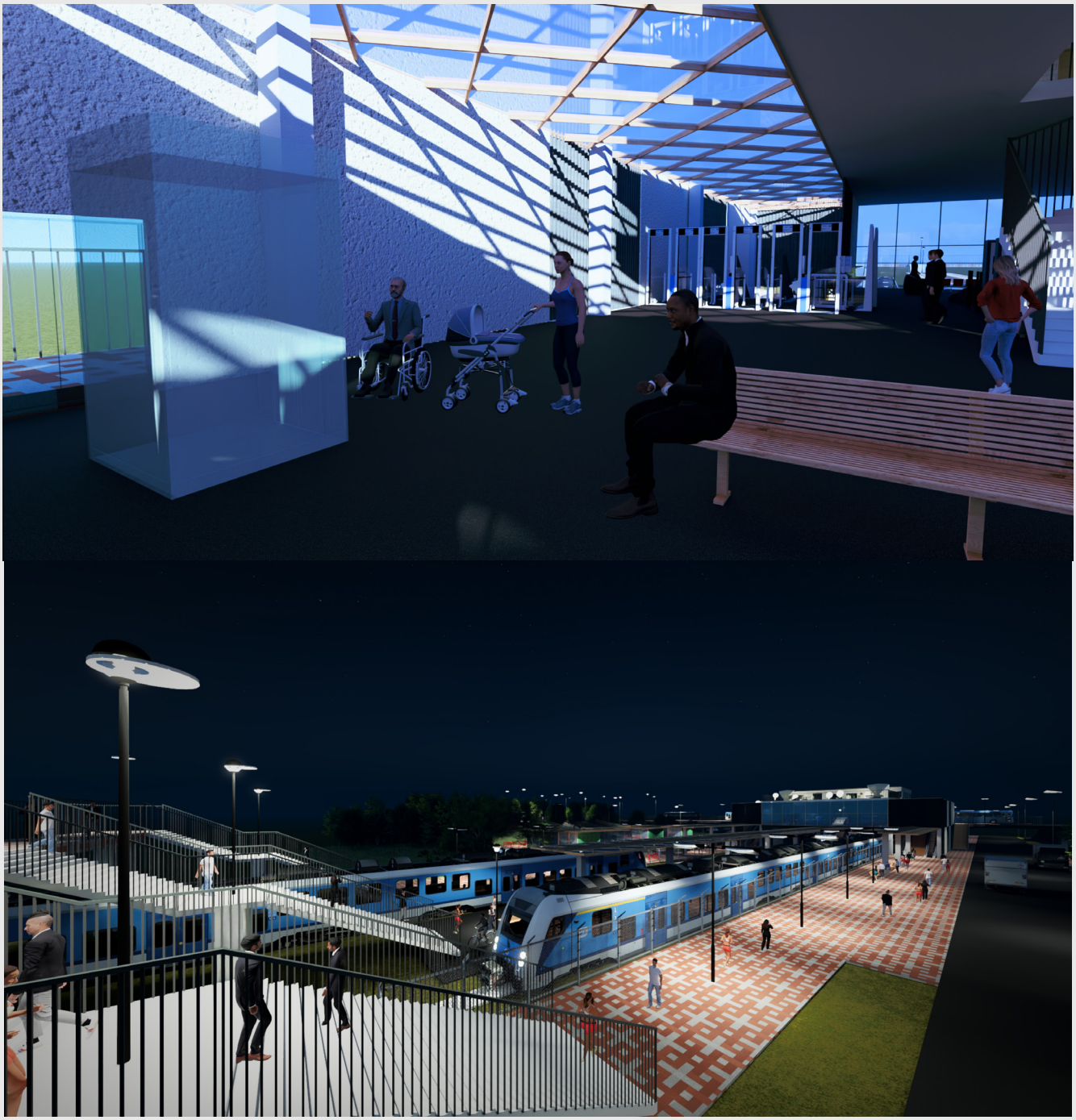


Figure 50: Elevators and lighting at night for easy accessibility throughout the hub. 2025

Figure 50 shows accessibility and safety options in the hub through lighting and elevators.

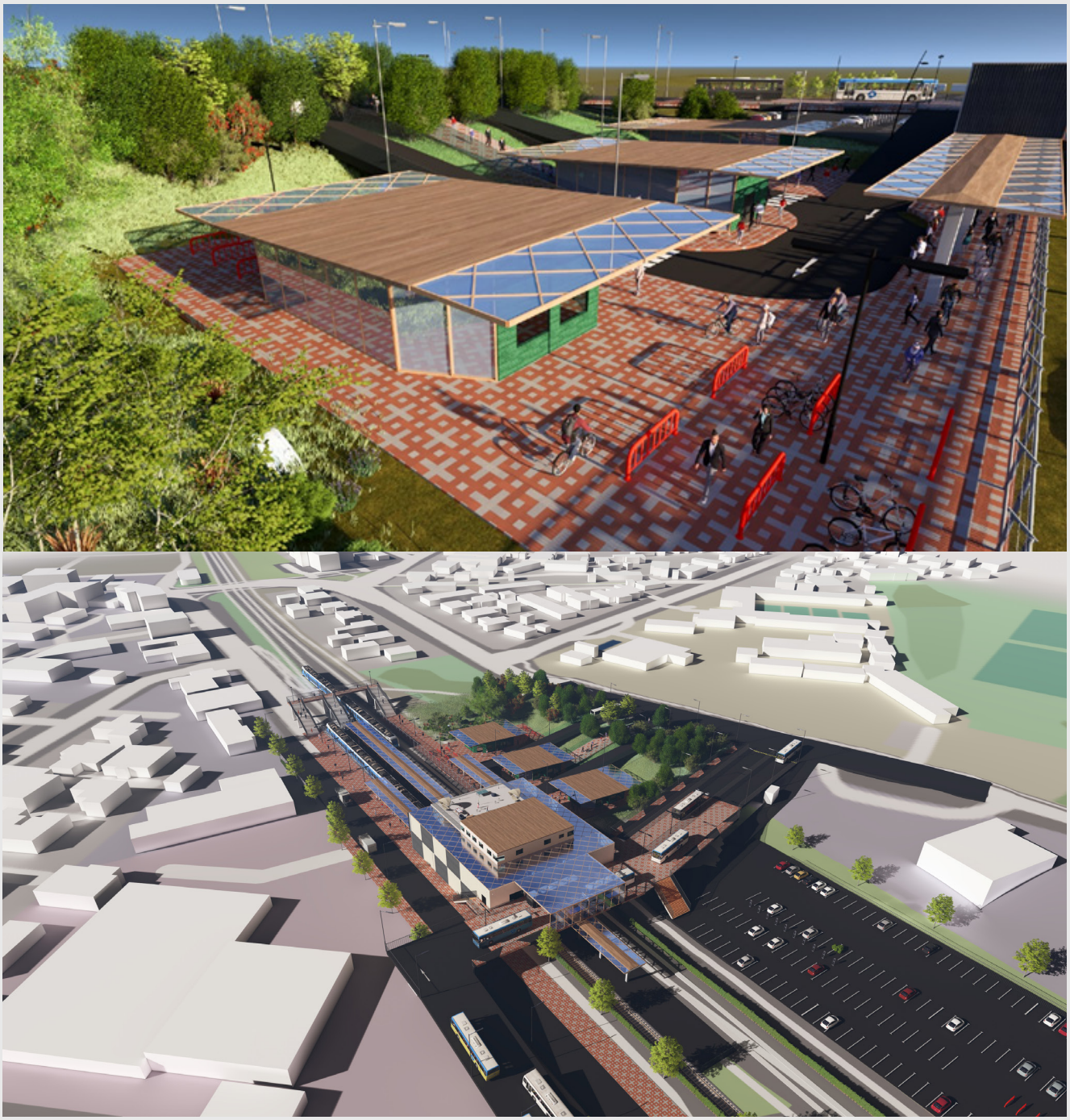


Figure 51: Existing urban greenery and amenities on site of Papatoetoe train station. 2025.

Keeping the existing and adding new urban greenery such as trees, plants and bushes on the site will promote a healthy environment and inviting atmosphere. A range of key design elements were carried from surrounding sites to better link this within the local space, such as steel panels inspired by the Puhinui station and wooden aesthetics from the local library. The cross-hatched pathway is taken from the city's Waitemata (Britomart) station, interlinking the two regions and promoting walkability. The green tiles add a personalised touch to the hub, while the concrete walls and columns are traced back to the town hall, alluding to the site's history.

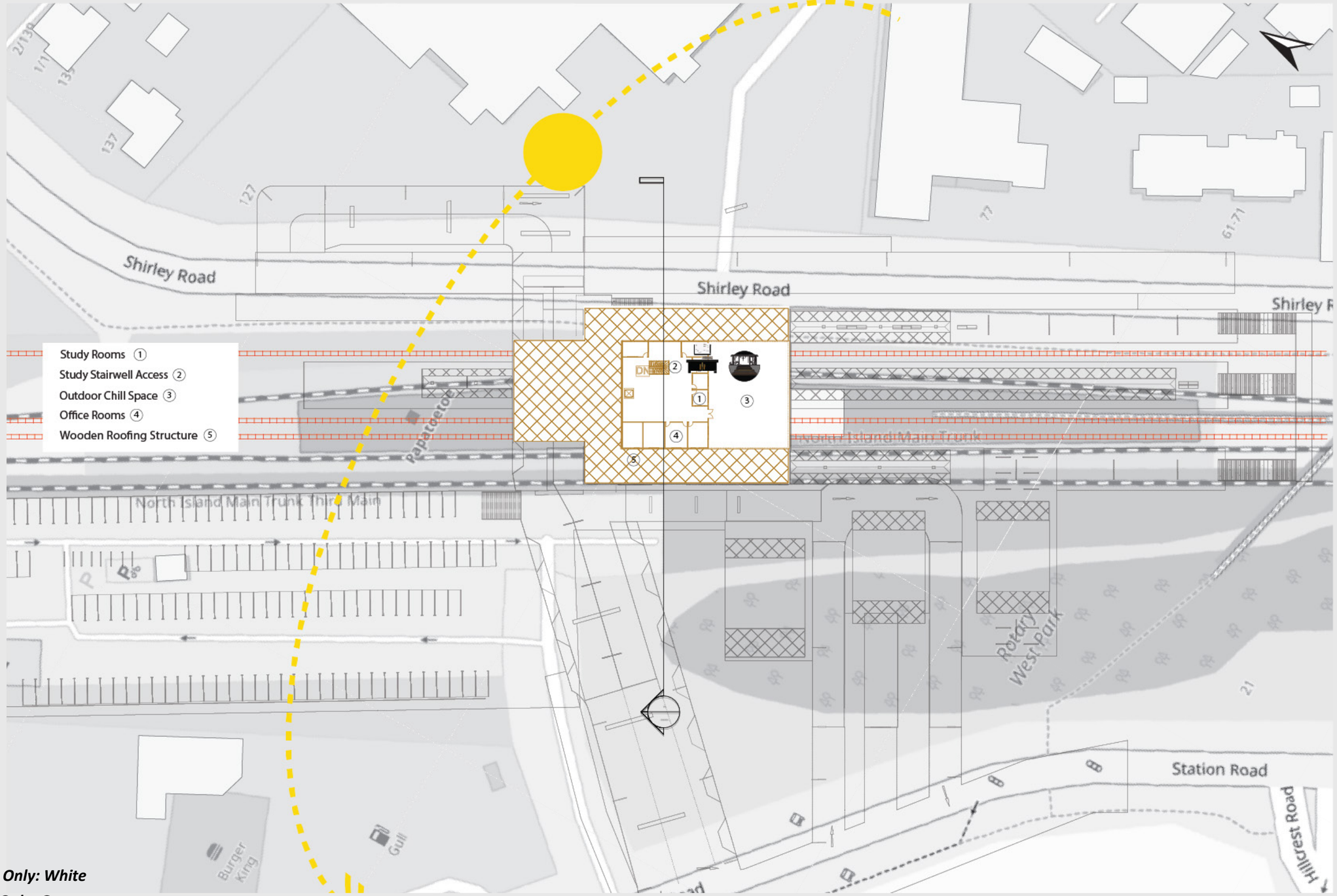
Figure 52: Natural lighting seen through the glass roofing facade. 2025.

Using lighting and wooden aesthetic features (Figure 52) creates a welcoming environment for commuters travelling. Different spaces allow different groups of people to come and interact with the hub, celebrating the diversity in the Papatoetoe region. Examples of different spaces include waiting areas with seats and digital boards displaying bus and train times. Offices and study rooms are available for hire, as well as a fruit and veggie shop, doctor, pharmacy, and retail shops outside the essential amenity buildings for locals and commuters. Additionally, the hub has kiosks for transport-related issues and restrooms for public use.

The intermodal hub is designed to facilitate ease of transportation and accessibility, featuring existing car parking and dedicated bus lanes. The new design implementation of the bridge overpass accommodates buses, shuttles, and shared pedestrian pathways, ensuring safe and efficient travel over the train tracks.

For the Papatoetoe Intermodal Hub, natural lighting would be integrated into the design of the roofing structure. Ventilation could be facilitated through open spaces such as entrances, exits, and outdoor areas. Radiant heating could be incorporated throughout the design of the walls and floors. Regarding site considerations, existing trees could be shaded for passive energy reduction, creating natural cool zones.

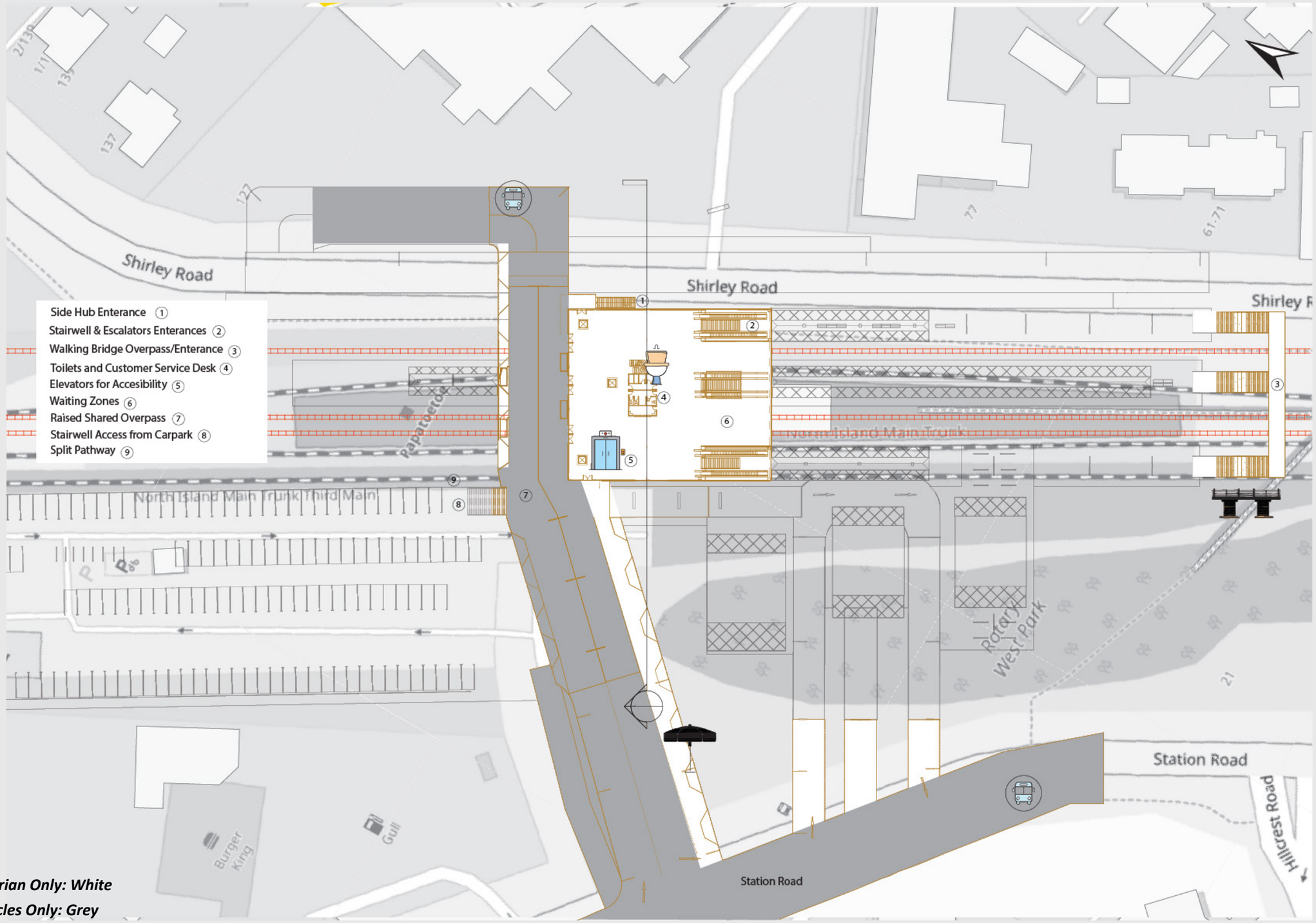
Intermodal Hub Floorplan: Top Floor



Pedestrian Only: White
Vehicles Only: Grey
Mixed: Grey & Orange Outline

Figure 53: Level 2 showing key programmes on the top floor with a sun path. 2025

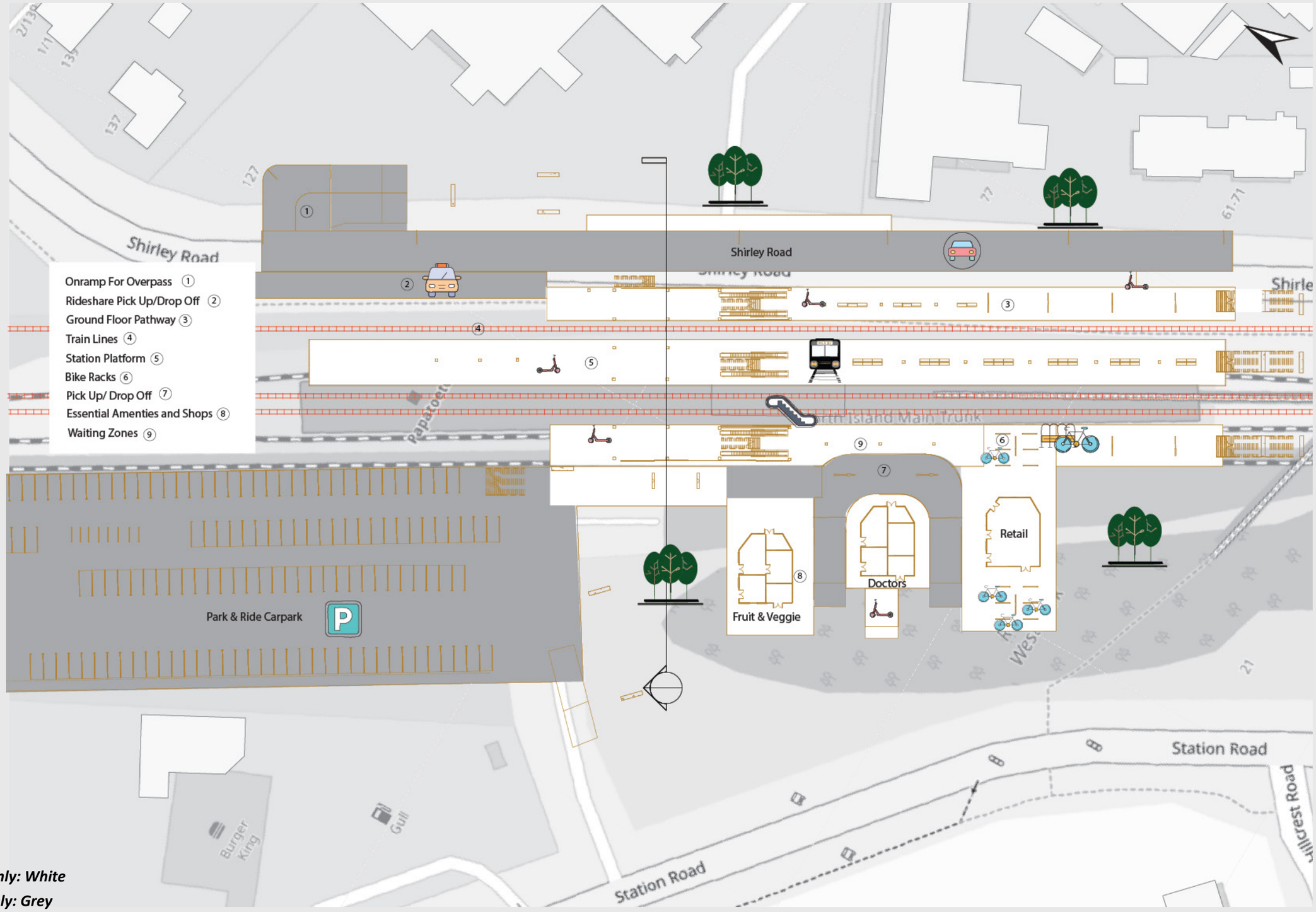
Intermodal Hub Floorplan: Second Floor



Pedestrian Only: White
Vehicles Only: Grey
Mixed: Grey & Orange Outline

Figure 54: Main floor for the hub showing shared pathways for pedestrians and vehicles(marked in grey) and walking spaces (marked in whte). 2025.

Intermodal Hub Floorplan: Ground Floor



Pedestrian Only: White
Vehicles Only: Grey
Mixed: Grey & Orange Outline

Figure 55: Ground platform showing all different amenities and pedestrian access points. 2025.

Figures 53, 54, and 55 are the floor plans for the intermodal hub. Every floor hosts different amenities regarding public transport and or general facilities for the locals of Papatoetoe to use. This intermodal mobility shows that the hub allows people to connect to local and suburban areas, as shown through different fun diagrams, to bring the playful factor into the plans.
Referring to the literature review, the transport hub precedents can be examples of what makes a transport hub work. Kings Cross station's addition of the new concourse helped rejuvenate the local area. Melbourne's Southern Cross station's integration of multi-modal transport options into its hub effectively connected commuters to outer regions and the Hine-Paka bus interchange for its sustainable material and environmental strategies.
Following these, Papatoetoe's hub can grow to host a range of mobility options and help revitalise the local area by attracting more residents to local shops.

Figure 56: Hub Section showing the amenities across different floors housed with people using the spaces. 2025.

Figure 56 shows the sectional view of the hub with different areas and amenities used by commuters and locals. The intermodal hub aspect in Papatoetoe can also be seen here through buses, bikes, trains, cars, pedestrians, sit-on and push scooters

Site Three: Suburban Street: Landscape and Fairview Road Intersection

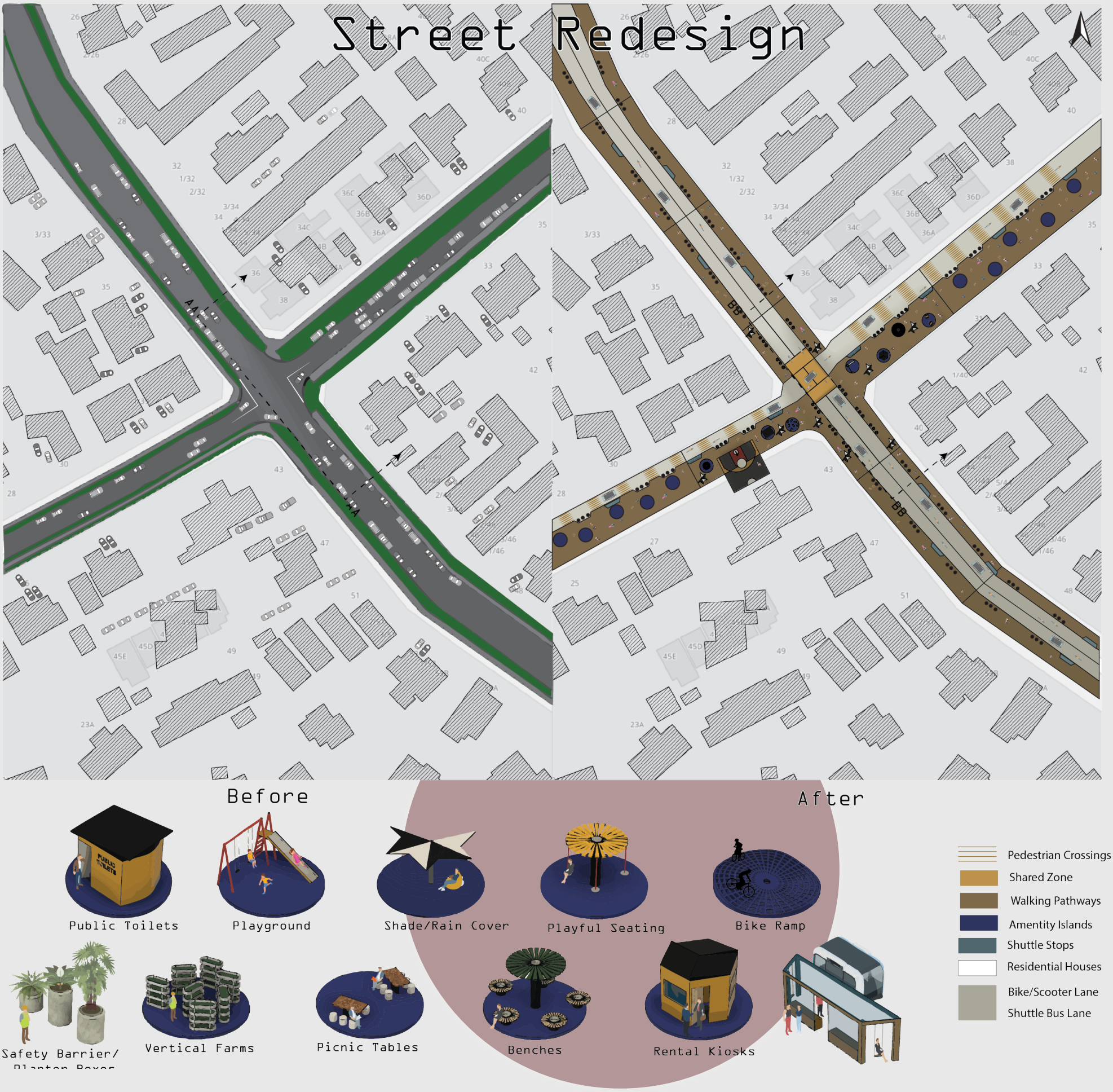


Figure 57: Suburban street redesign: Showing before with cars and after with different amenities for locals to use. 2025.

The suburban street site was selected to illustrate the transformation that can be achieved by adding a hub that enhances connectivity. This improvement offers locals a more interconnected region and increases their access to amenities.

Site Three: Suburban Street: Before

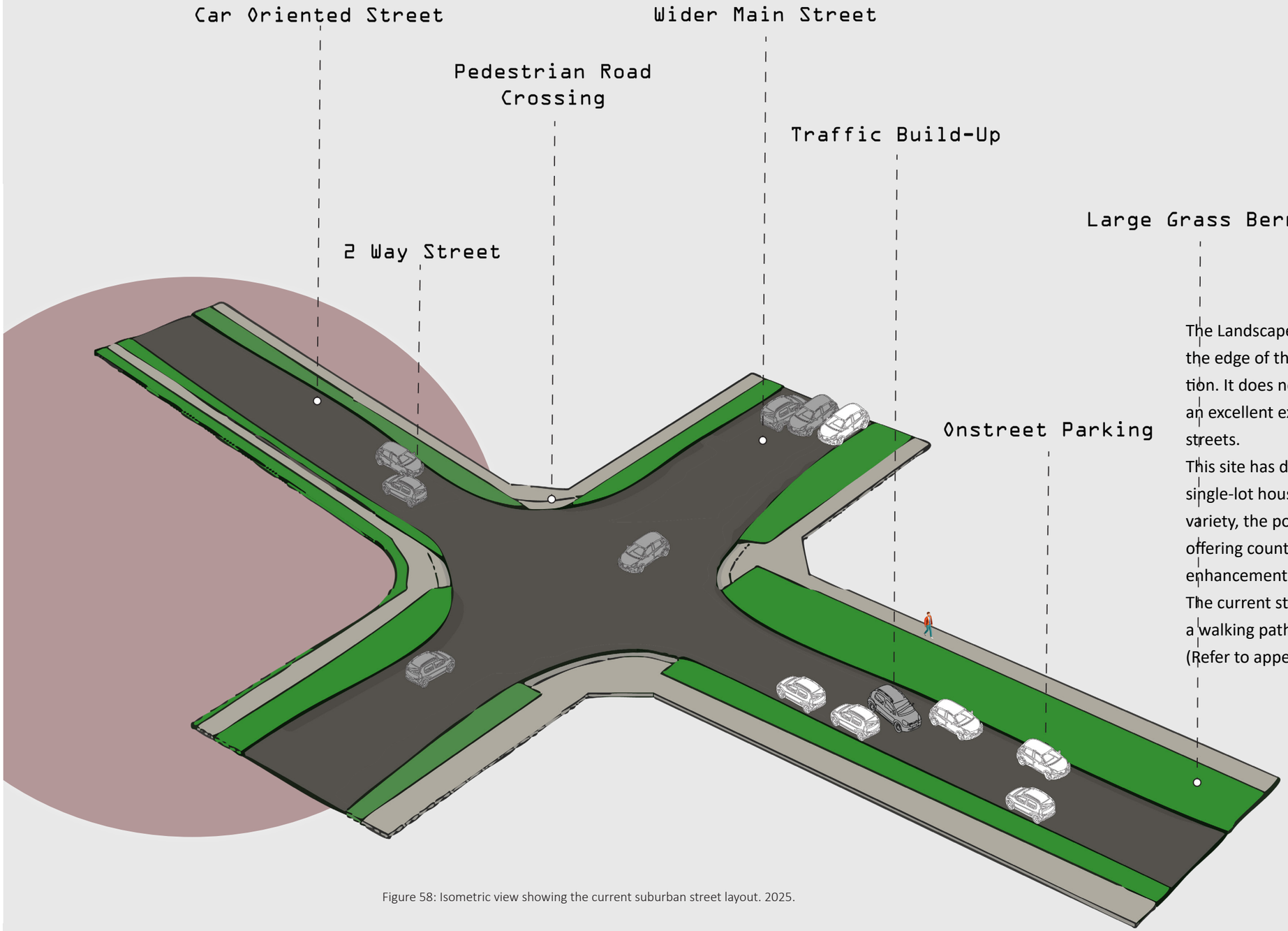


Figure 58: Isometric view showing the current suburban street layout. 2025.

The Landscape and Fairview Roads intersection (Figure 57) is on the edge of the potential 15-minute circle from Puhinui train station. It does not fall within the proposed high-density zone and is an excellent example of the potential for transforming suburban streets.

This site has diverse housing options, including townhouses, large single-lot houses, apartments, and two-storey homes. With this variety, the potential for transforming the street is immense, offering countless possibilities for development and community enhancement.

The current street layout (Figure 58) consists of large grass berms, a walking pathway, and a central road with street parking.

(Refer to appendix F for render)

Site Three: Suburban Street: After

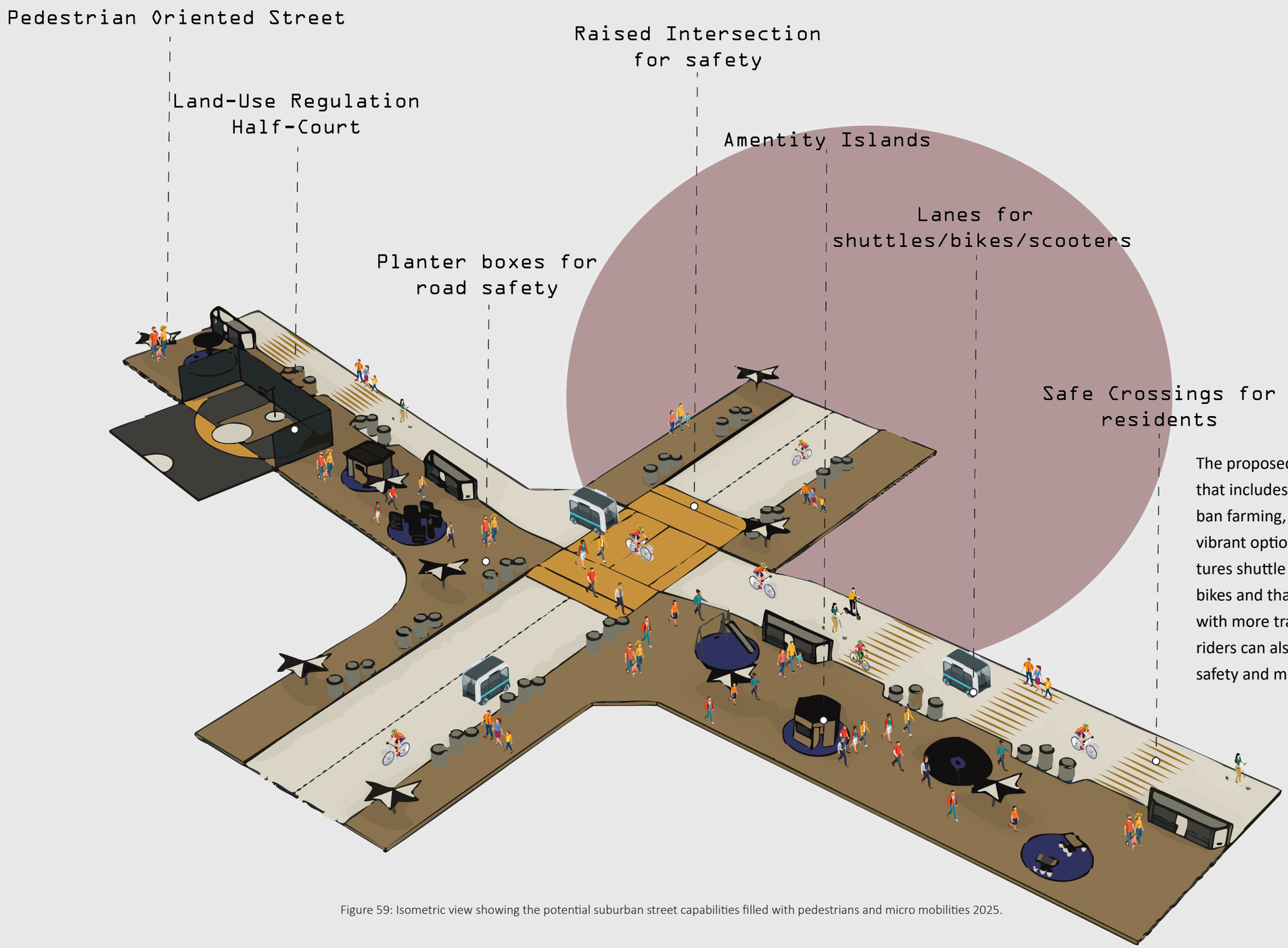


Figure 59: Isometric view showing the potential suburban street capabilities filled with pedestrians and micro mobilities 2025.

The proposed concept (Figure 59) is a playful initiative that includes various amenities such as picnic tables, urban farming, work kiosks, playgrounds, and many other vibrant options. The proposed street design also features shuttle lanes that can be utilised by scooters and bikes and that loop around Papatoetoe to provide users with more travel choices. Cyclists and electric scooter riders can also use these shuttle lanes, enhancing their safety and mobility. (Refer to appendix I for render)

The design aims to eliminate roads made for cars and convert them into pedestrian spaces for local users. The variety of transportation options would minimise reliance on private vehicles, decreasing the need for cars and on-street parking. Figure 59 shows this concept of car-free areas and pushes for street walkability. With access to the various amenities, locals should occupy the streets and interact with one another.

Figure 60: Sectional showing differences between the before and afters for the suburban street redesign. 2025.

Figure 60 illustrates two different atmospheres of the same street; one has a gloomy grey atmosphere brought on by the black tarred road transformed into a bright and inviting street brought by the coloured pathways and the addition of various amenities. Residents can utilise these and be connected to the broader Papatoetoe region through an improved transport network system.

Chapter Five: Design Discussion

The Design Discussion chapter critically reflects on the key design decisions, methodologies, and urban strategies implemented in this research. This study explored how intermodal transport hubs, high-density corridors, and pedestrian-friendly street designs can transform suburban environments, specifically in Papatoetoe, to improve accessibility, connectivity, and sustainability. The discussion evaluates the effectiveness of these interventions, linking them to broader urban mobility frameworks such as Transit-Oriented Development (TOD) and the 15-Minute City concept.

This research highlights the potential scalability of its design strategies, suggesting that similar intermodal transport models could be applied to other Auckland suburbs and beyond. The discussion also identifies areas for future research, such as policy recommendations, technology integration, and community engagement in transport infrastructure planning.

By critically analysing the successes and limitations of the proposed architectural interventions, this chapter comprehensively evaluates how design and transport planning can be harmonised to create vibrant, accessible, and sustainable suburban environments.

Reflection on Design Methodology

The methodological approach adopted in this research combined mixed methods and design thinking to develop a practice-based architectural intervention for intermodal transport hubs in suburban contexts. This reflection evaluates the effectiveness, challenges, and insights gained through this methodology, assessing its impact on the design process and outcomes.

Integrating literature reviews, case studies, and empirical data analysis provided a strong theoretical foundation for the design intervention. Using traffic data from Auckland Transport allowed for evidence-based decision-making, ensuring design solutions directly addressed real-world urban mobility challenges. Additionally, by employing urban mapping techniques, such as distance mapping and controversy mapping, the research successfully identified high-congestion zones and accessibility gaps, informing the placement of intermodal hubs and high-density corridors.
The design thinking approach, which involved prototyping, CAD modelling, and iterative testing, proved highly effective in translating research insights into tangible design solutions; by testing multiple spatial configurations, the methodology refined transport-oriented street layouts, emphasising walkability, mixed-use development and sustainable transit networks.

While the methodology provided a comprehensive research framework, certain limitations were encountered.
1. Data Accessibility & Scope – While useful, the research relied on publicly available transport data, which did not always capture real-time commuter behaviours and micro-scale traffic flow patterns.
2. Regulatory Constraints – The Auckland Unitary Plan imposes zoning and density restrictions that may impact the practical implementation of proposed high-density mixed-use developments.
3. Scalability & Community Engagement – The research focused on architectural and transport design, but a more holistic urban planning approach would require stakeholder engagement, policy integration, and socioeconomic considerations.
The multi-scalar approach (analysing transport networks at regional, suburban, and street-level scales) was instrumental in ensuring a context-sensitive design. Future research could build upon this by incorporating real-time mobility tracking, policy simulations, and participatory design strategies, allowing for a more adaptive and responsive transit-oriented urban framework.

The practice-based methodology used in this research successfully bridged the gap between architectural design and transport planning, leading to a holistic, integrated solution for urban mobility enhancement in Papatoetoe. Despite some challenges in data accuracy and regulatory constraints, the methodology provided a flexible and iterative design framework that can be replicated and adapted to other suburban contexts.

Reflection on Key Design Objectives

Objectives	Goals	Limitations
1. To examine the effect of intermodal transport hubs on the connectivity and accessibility of neighbourhoods. 2. To evaluate the impact of transport hubs on urban density and land use.	• Better connected residents • Walkable neighbourhoods • A multi-modal hub • Access to essential amenities and services (doctors, grocery stores) • Redesigned streets	• Introducing mobility hubs without significant disruption • Communities may resist changes due to concerns about increased congestion, a reduction in parking spaces, or alterations to the character of neighbourhoods. • Private vehicle owners are opposed to walkable neighbourhoods

Table 2: Showing objectives, goals and limitations for the research. 2025

Design Decision Elements	Why were they chosen?	Where were they implemented?
1.Spatial Organisation & Layout	Zoning and Land Use: A basketball court on the street and overpass in the hub	Hub floor plan - amenities and offices (Figures 44, 45, 46 and 49) Street plan – amenity islands, walking pathway, and shuttle lane(Figures 42 and 47)
2. Accessibility & User Experience	1. Universal Design – inclusive for all users. 2. Seamless transitions for different modes of mobility across transport nodes.	1. Elevators, stairs, and escalators in the hub (Figures 40 and 41) Shared intersections and crossings for streets (Figure 42) 2. Designated zones for each mode of transport: bus stops, train platforms, ride-share drop-offs, scooter/bike stands, and car parks at the hub (Figures 40, 41 and 42). Specific lanes for bikes, scooters, and shuttles on the streets and for the shuttle stops (Figures 42 and 47)
3. Sustainability & Environmental Considerations	1. Green Infrastructure - Environmental and Social Benefits 2. Sustainable Materials	1. Urban forest in the hub (Figure 42) planter boxes and trees along the streets (Figure 47) 2. Wooden roof: Reuse the existing concrete train platform and use recycled glass panels from the old train station in the hub (Figure 43). Recycled plastics for playgrounds, seating, and urban farm boxes on streets (Figure 47)
4. Safety & Security	1. Crime Prevention 2. Pedestrian and Cyclist Safety	1. A well-lit hub to enhance safety and visibility in public spaces (Figure 41) Reused streetlights for roadways (Figure 47) 2. A shared pathway for cyclists and pedestrians within the hub (Figure 40)
		Dedicated lanes for cyclists and pedestrians on the road (Figure 49)
5. Community & Social Interaction	1. Public Gathering Spaces 2. Flexibility and Adaptability Reuse	1. The waiting zones and shops at the hub (Figure 41) promote social engagement through whole-street design (Figure 47) 2. The wooden roofing of the hub can be dismantled and reused over time (Figure 41). Each amenity island can be adjusted based on community engagement (Figure 47)
6. Transportation & Mobility Integration	1. Intermodal Connectivity 2. Parking and Drop-Off Areas	1. Bus lanes, train lines, e-scooter lanes, shuttle lanes, ride-share parking, bike lanes, wheelchair access, and pedestrian pathways are integrated within the hub. Shuttle lanes, bike lanes, scooter lanes, and pedestrian pathways are also integrated into the streets. 2. Dedicated pick-up and drop-off spaces for ride shares, buses, and shuttles are available in the hub. Shuttle stops are located in the streets.

Table 3: Showing key design decisions gathered from key precedents. 2025

The design effectively met its objectives as it facilitated the exploration of concepts regarding neighbourhood connectivity and accessibility by addressing key design features and concerns. Integrating a transport hub in Papatoetoe to promote transit-oriented development would implement changes that could directly affect urban density and land-use regulations. The transport hub's impact is likely to be significant, advocating for improved zoning plans for the future of Papatoetoe and Auckland. Areas for improvement include the mappings carried out; they could be more apparent in identifying issues of the different sites, which would ensure a more thorough assessment and offer planners the chance to reduce further the number of problems construction may encounter later on.

Reflection on Design Outcomes:

The evolution of the design was iterative throughout the research for this project, but there were three distinctive sites, each requiring its design solutions, allowing each site to be reviewed separately before reviewing as a whole

Site One: Hub

Initially, designing the hub was the sole solution and was put into Papatoetoe train station. The design started with the concept of a bus overpass. This was followed by the concept of the hub around the existing platform and railway lines, a wooden cross-hatched roofing structure with glass, and a drop-off/pick-up point for buses. These elements adhered to standard transport hub design features, with key aspects from the surrounding stations incorporated to create a narrative among the train stations. Features included a steel façade, concrete walls, and large glass panels to help the hub blend in. However, this design made the hub less pedestrian-friendly and more orientated towards buses.

Site Two: Streets

Introducing pedestrian streets involved removing car roads and transforming them into walkable neighbourhoods. Various playful features and amenities were added to encourage locals to venture out and enjoy themselves without the concern of vehicles nearby. The concept of amenity islands was implemented, providing numerous amenities and activities for locals to utilise. The term island was used to show that the amenities can be changed and moved to other locations. Consequently, the idea of land-use regulation and planning emerged, necessitating zoning changes to facilitate the development of transit-oriented and walkable communities. Streets cannot exist without 'roads' to ensure that emergency services can access them; therefore, a shared lane for shuttles, bikes, and scooters was integrated, creating shared spaces prioritising walkability.

Site Three: Hub & Streets

Combining the two parts resulted in the hub having more pedestrian-friendly spaces. Amenities could be shared between the hub and the streets, with some amenities carried over from the hub and vice-versa. This creates a seamless connection between the two projects. The playfulness of the streets was integrated into the hub, creating a fun and interactive space for locals. A new floor was introduced and added to the hub to accommodate office spaces and outdoor areas for commuters and locals to enjoy. Additionally, shops were also incorporated into the hub.

The Three Sites Interconnected

When combining all three concepts, we are left with an interlinked transport system that prioritises connectivity in the region of Papatoetoe. All these sites work together as a whole. They cannot be understood separately where the hub provides commuters with transport options to the wider Papatoetoe area and Auckland, the streets fill in the unconnected spaces with walkable zones, and shuttle/bike/scooter lanes link up the Papatoetoe region. Individually, every site would require additional support in order for it to work, which can be a potential weakness.

Conclusion & Future Research Opportunities

This practice-based research considered different scales of urban planning to compile a project that examined distinct issues. The principles of transit-oriented development (TOD), 15-minute walkable cities, and high-density zones were approaches reflected in the different scales' designs. A concept for a transport network system was developed, linking the intermodal transport hub with street redesigns. Together, this fostered a connected Papatoetoe region, further enhancing what already exists for the locals—a shared space for all, ensuring equal accessibility and connectivity.

The research explored several key topics that contributed to the design solutions and provided the foundation for this study. This groundwork underpinned the research and assisted in developing the proposed design solutions.

This research employed mixed methods and design thinking as its methodological approach, as relying on a single method seemed insufficient. Mixed methods facilitated the analysis of existing data (Figure 24), while design thinking introduced human-centred solutions. Together, they formed a methodology that prioritises people, supported by evidence. The design concepts were crafted to enhance user experiences rather than complicate them.

The final chapter focused on the design being developed based on previous research. It split the design phase into three headings: Chapter Three: Design Overview, Chapter Four: Design Proposition and Chapter Five: Design Discussion. It began with broader mappings before narrowing in on the solutions of the hub and street redesigns. Viewing these as two separate sites yet interlinking them through specific amenities and walking pathways also aided in addressing issues in distance mapping (Figure 28) and matrix mapping (Figure 29).

Further research could focus on constructing these two designs and employing methods to allow the hub to expand or contract with population increases or decreases. Further research could also explore modular construction techniques and how they might be applied in this context. Improvements could be made to the hub and the streets; as times change, different material choices could be implemented, and research into how mobility types could be integrated with AI to create more responsive and optimised route and timing options for users.

Integrating intermodal transport hubs and high-density corridors in Papatoetoe is a scalable model for other suburban regions in Auckland. Future research could explore how similar interventions can be implemented city-wide to improve sustainable mobility.

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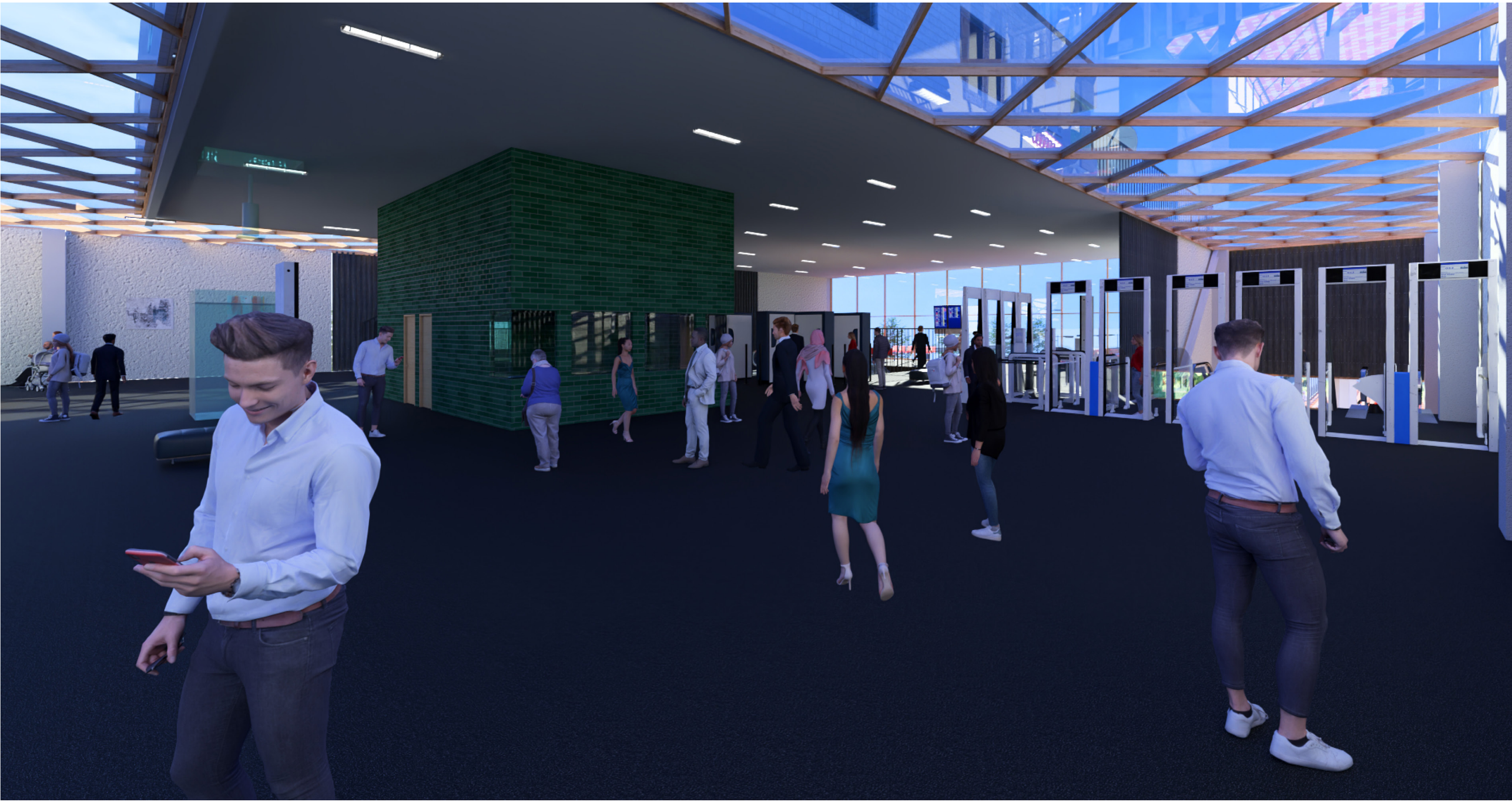
Thank You

Appendix A



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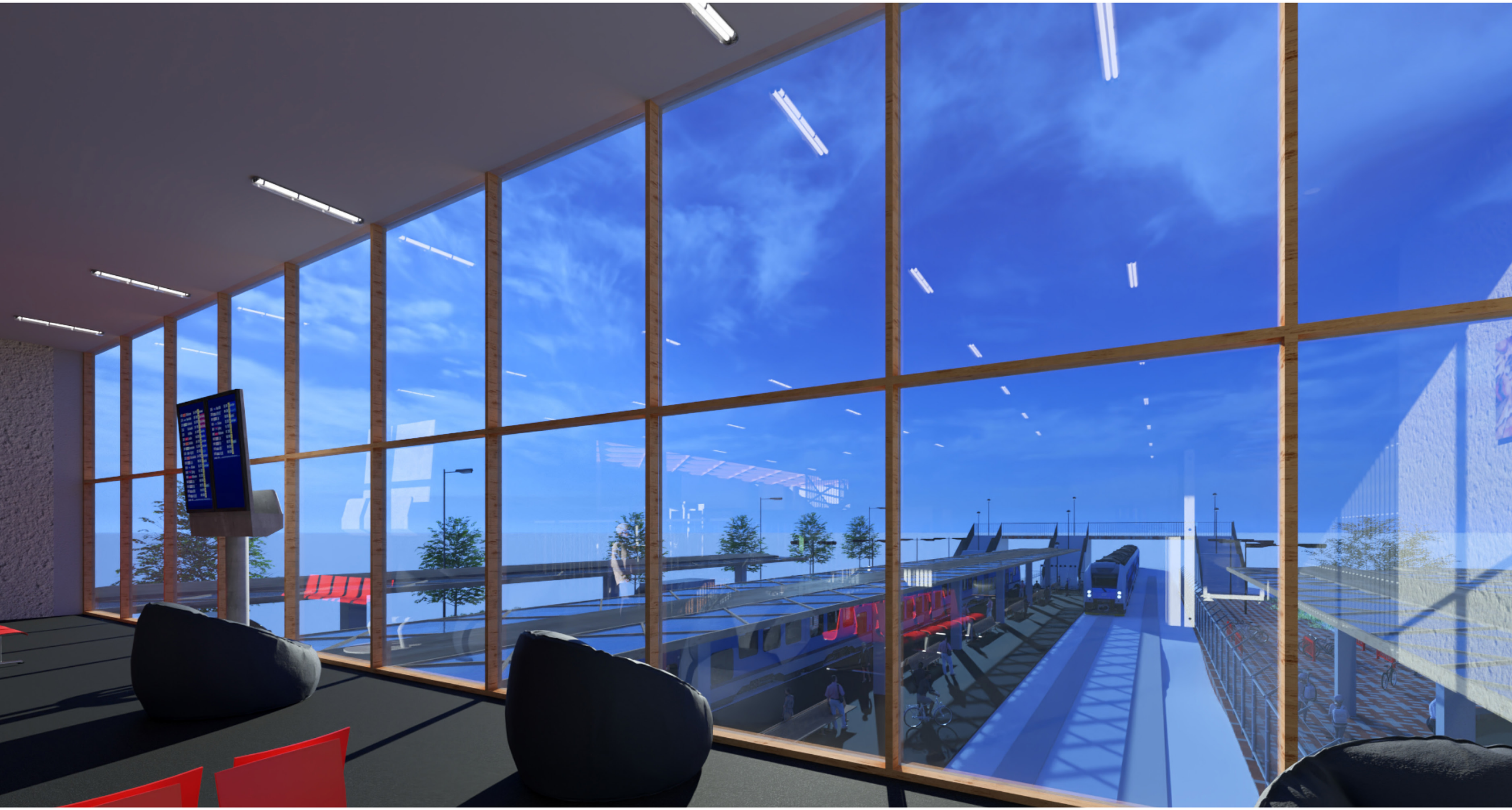

Appendix C

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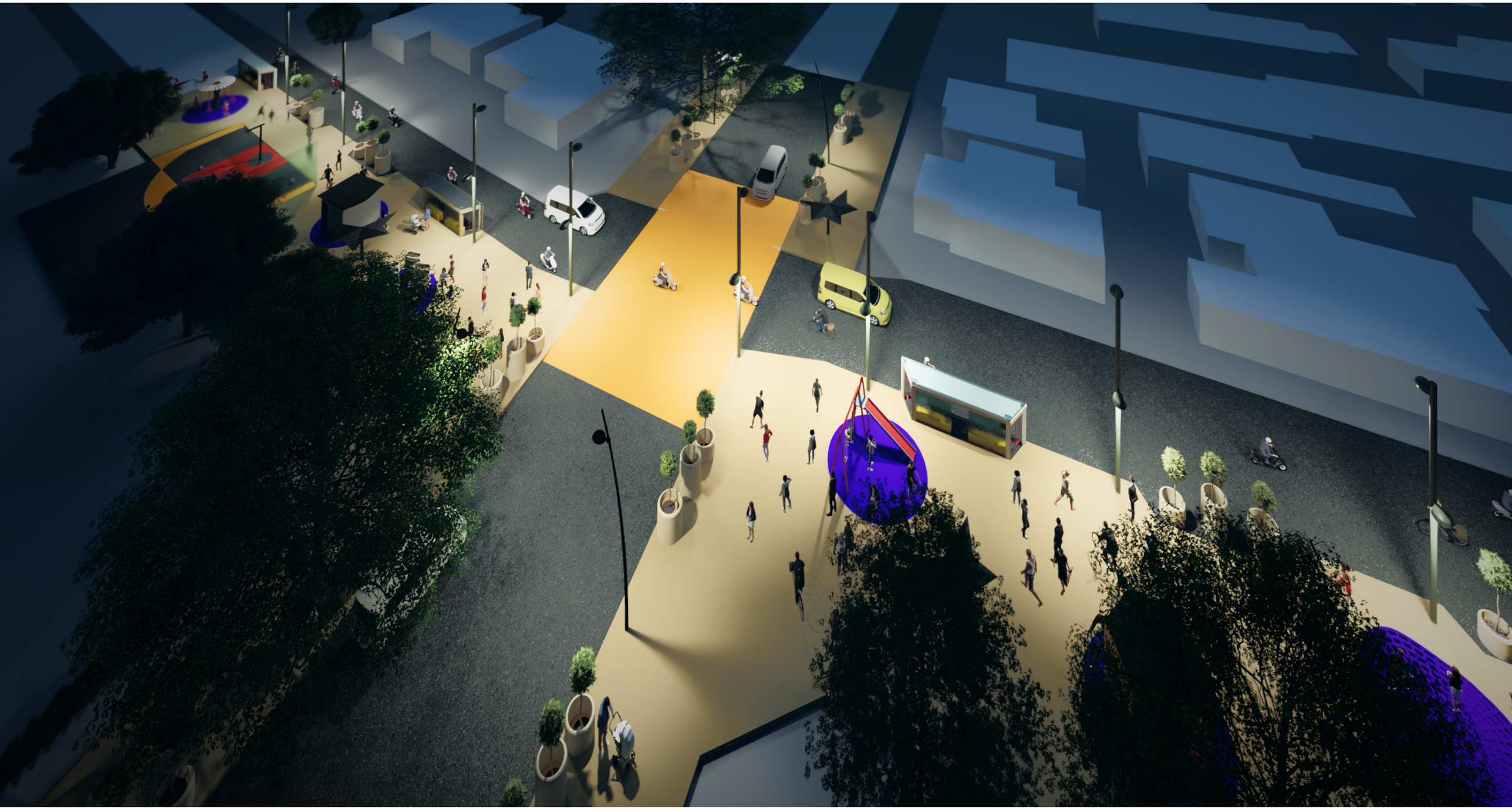
Appendix K



Appendix L

Appendix M

Appendix N

Appendix O