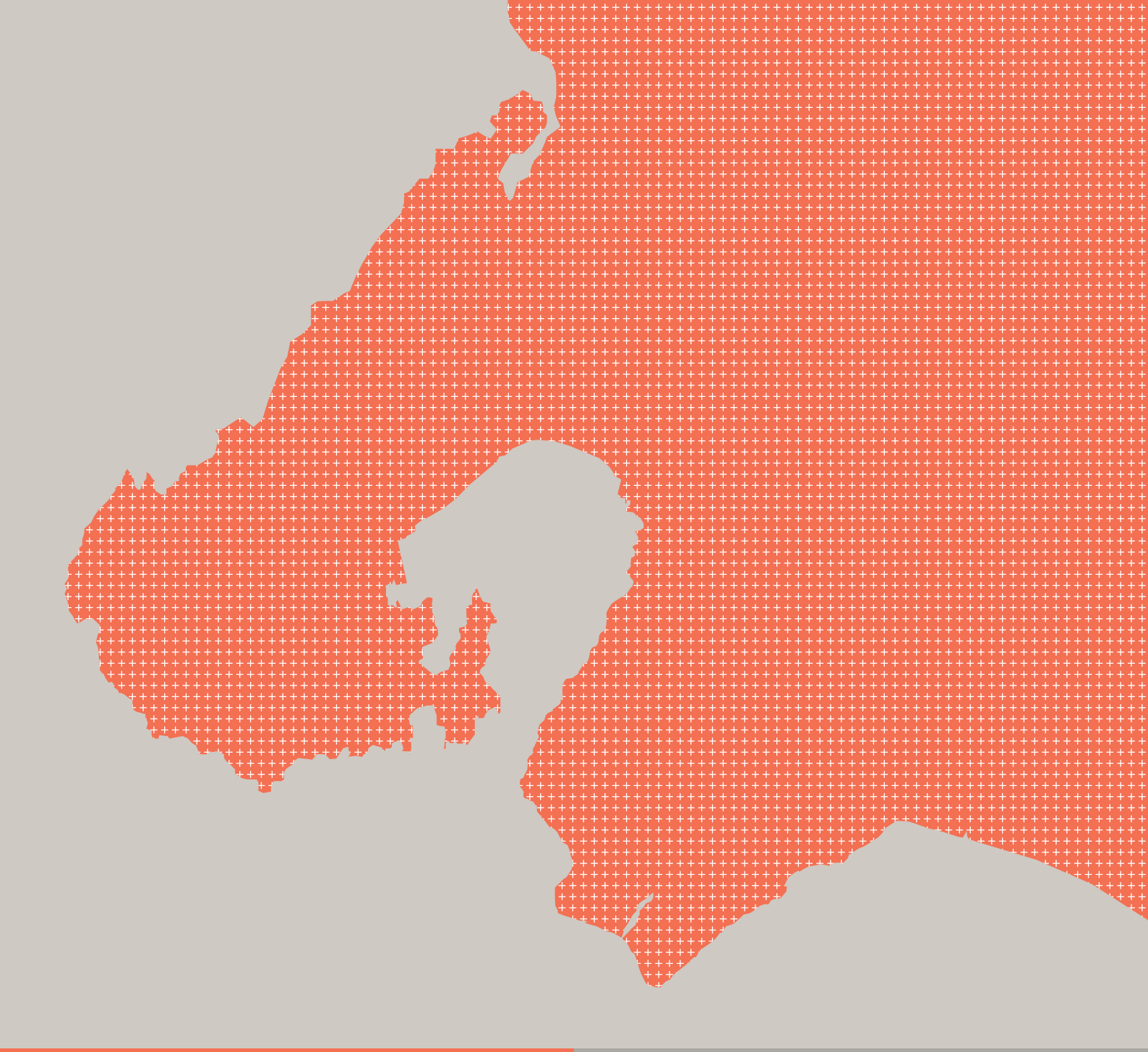


WATERLOO STATION & INTERCHANGE
STRATEGIC DIRECTION & BRIEF

MAY 2025

PREPARED FOR:
GREATER WELLINGTON REGIONAL COUNCIL

Greater Wellington
Te Pane Matua Taiao

VERSION CONTROL			
VERSION:	**STAGE / STATUS:**	**AUTHORED BY:**	**APPROVED BY:**
Version 3.0	FINALREVIEW		

REVISION NOTES	
VERSION:	**AUTHORED BY:**
Version 1.0	First Draft Issued for Review by GW.
Version 2.0	Second Draft Issued 21/07/2025

1. EXECUTIVE SUMMARY

Context & Importance

Originating as a rail terminus in 1927, Waterloo Station has evolved significantly over the century, becoming a central hub for both rail and bus services in the Hutt Valley. The station's development has paralleled the suburban growth of the area, particularly following the electrification of the railway line in 1957 and the establishment of the Waterloo Bus-Rail Interchange in 1988.

With increasing passenger volumes and the need for modernisation, this document outlines the design considerations and planning necessary to optimise Waterloo Station as a contemporary public transport hub. This report outlines the project brief including requirements of specific design elements, structural considerations, and investment and project objectives essential for the station's redevelopment.

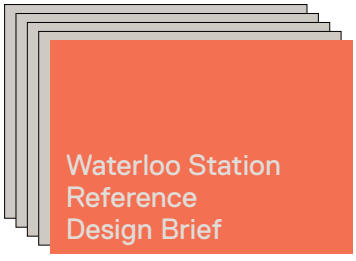
Waterloo Station and its associated bus interchange are central to the public transport network in the Hutt Valley. The station has been selected as the first Transit-Oriented Development (TOD) site and designated a Priority Development Area (PDA) by the Wellington Regional Leadership Committee (WRLC). Optimisation of the station and transport network are also key to Hutt City Council's Long Term Plan, and Wellington Rail Programme's Business Case.

Project Purpose

The purpose of this project is to develop a reference design for Waterloo Station that addresses the issues presented in this report and enables TOD initiatives that have been presented in a prior commercial study. The intent is to develop a robust reference design 'concept-lite' through a feasibility study process to inform future implementation and investment decisions.

1.1 Project Phases and Outputs

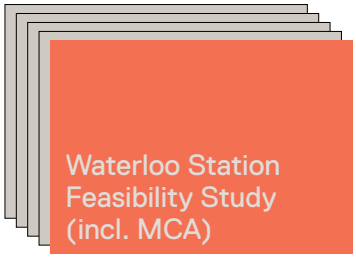
The project is divided into three stages, each producing key outputs that build toward the final Reference Design:



DEFINE AND DISCOVER

Output: Design Brief

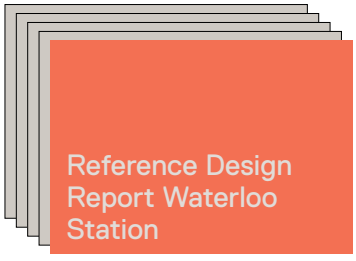
Establishes the foundation for the project: case for change, project objectives, investment objectives, design principles, technical requirements.



FEASIBILITY STUDY

Output: Feasibility Study – Multicriteria Assessment

Assesses the long list of options using defined criteria to identify a shortlist and then a preferred option



REFERENCE DESIGN

Output: Final Reference Design

Provides a detailed, feasible design for the station based on the preferred option from the shortlisted option(s).

1.2 The Design Brief

The Design Brief is a living document developed during Stage 1 to be tested through the feasibility process and updated as the project evolves. It guides the overall Reference Design process

This document describes key project drivers, objectives, aligns the vision and principles that will guide the subsequent stages of the project, It has been developed during the first stage of the Reference Design process and builds upon briefing material and previous work completed by Greater Wellington Council, as well as work completed by the design team during the Define and Discover Phase, including outcomes from project workshops and desktop studies.

The Design Brief is structured into three key sections:

1. Background – the history of the station
2. Strategic Direction – Clarifies the overarching goals and vision for the project.
3. Opportunities and Constraints – Identifies key project opportunities and constraints.
4. Forecast Demand and Technical Requirements – Defines the essential technical criteria for the project.

Appendices included in the report (documents developed during the Phase 1).

A. Benchmarking Summary

B. Aurecon Static Sizing Assessment Memo

C. Site Investigation Report and Constraints (by each discipline) – presented and discussed in Workshop 1

D. Brief Development - Key Themes, Principles and Objectives – presented and discussed Workshop 2

E. Benchmarking presentation – Presented in Workshop 2

Investigation of the Waterloo Station TOD to date has been undertaken in two phases:

→ Phase I – Concept Study (Combines Station and TOD)

→ Phase II – Commercial Study, including a high level economic review (Willis Bond)

- Appendix 1 – Property Economics Report
- Appendix 2 - Hypothetical Scenarios

In addition, studies have been undertaken on the Waiwhetū Aquifer and a condition assessment on the space frame roof of the Waterloo Station (these two studies are summarised in Opportunities and Constraints section of this document, and extended summary is in Appendix C).

REFERENCE DESIGN TEAM

Greater Wellington Te Pane Matua Taiao

RCP

GRIMSHAW

Dunning Thornton

aurecon

Tonkin+Taylor

RLB Rider Levett Bucknall

wsp

Boffa Miskell

2. BACKGROUND

Waterloo Station located in the Hutt Valley on the Wellington – Wairarapa and Wellington – Hutt Valley rail lines. It is within the Hutt City Council and Greater Wellington Regional Council (WRLC) local government boundaries.

Rail from Wellington Waterloo was first established in 1927, terminating in a then open field. The electrification of the railway line from Wellington in 1957 contributed to the significant suburban development of the Hutt Valley throughout the mid-century into the suburban centre it is today.

The 'Waterloo Bus-Rail Interchange' was opened in November 1988 in a development partnership between Wellington Regional Council, Railways Corporation and Lower Hutt City Council (as these organisations were then known). Total cost of the project was $11.6m in 1988 dollars, equating to an inflation adjusted sum of approximately $28.3m in 2024 dollars using CPI indexing.

After Wellington station, Waterloo Station is second busiest rail station by passenger volumes. It is a stop:

→ At peak times for all Hutt Valley Line express services.

→ For the Hutt Valley for all Wairarapa Line services (Upper Hutt, Waterloo, Petone).

→ For increased Wairarapa services under Lower North Island Rail Integrated Mobility (LNIRIM).

Waterloo is also a bus hub for services to/from major catchments in the region including Wainuiomata (standard routes 160,170), Naenae (high frequency route 130), Seaview (standard route 121), and Kelson (standard route 150).

At the time of its opening in 1988, a key and current feature of the station was a "huge tubular steel and transparent plastic space frame", then the largest of its kind in New Zealand. The 'space frame' feature currently dominates the Waterloo precinct and gives the station and environs its overall character. The original space frame structure was built in 1987 (37 years old) and now manifests an increasing maintenance burden for which, Greater Wellington bears significant annual costs. Specifically, around the extensive use of tiles throughout the precinct and perspex canopies in the subways, on top of the ongoing work to assess and maintain the space frame. In addition, the existing structure and layout of the station does not provide the ability for optimisation in line with a modern public transport hub.

In May 2022, the Wellington Regional Leadership Committee (WRLC) confirmed Waterloo Station Transport Orientated Development (WTOD) as a Complex Development Opportunity (CDO). CDOs were later renamed Priority Development Areas (PDAs) by the WRLC. PDA status formalises partnership for the project between central and local government, enables collective planning, decision making, problem solving and issue resolution and risk mitigation, and enhances the ability to access central government resources.

PDA's have a special partnership arrangement with central government agencies because they:

A. Have the potential to deliver significant housing and other benefits to the region

B. Especially support the WLRC objectives

C. Are in key locations where successful development gives effect to those agreed strategic objectives

D. Are complex, and working in partnership is required to deliver at the desired pace and scale

3. STRATEGIC DIRECTION

3.1 Case for Change

The current Waterloo Railway Station was constructed in 1988. In recent years the roof structure has suffered from ongoing maintenance issues and is nearing its end-of-life. The need to replace the station roof has provided an opportunity for the station infrastructure and surrounding urban catchment to be considered as transit oriented development candidate.

A transit-oriented development (TOD), is a mixed use urban area within 600m – 800m walking distance of a transit stop (e.g. train station) and core commercial and or residential area. TODs can also integrate and provide transfers between multiple transport modes including walking, passenger rail, bus, cycling and cars.

Waterloo Station has been selected as the first TOD and a Priority Development Areas by Wellington Regional Leadership Committee (WRLC) due to:

→ A need to address major and end-of-financial-life infrastructure issues in the Waterloo Station.

→ The availability of prime commercially developable land in the wider Waterloo Station precinct, which is currently under-utilised from a land use perspective and in the ownership of Greater Wellington Regional Council.

→ Waterloo station and precinct's strategic location in the Hutt Valley, and large footprint (approximately 18,865m2 of developable land) largely used for free to use carparking.

→ The opportunity to develop Waterloo Station as an integrated transport hub linking the Hutt Valley with RiverLink, Hutt CBD, Wellington Central, Upper Hutt and the Wairarapa.

→ The potential of the Waterloo Station precinct to contribute to realising the Wellington Regional Growth Framework (WRGF) objectives and goals by enabling urban intensification and enhancement in Hutt City.

→ The potential of the Waterloo Station precinct to facilitate urban intensification in the wider Lower Hutt City catchment, act as a site for employment (e.g. anchor tenant office space) and the provision of social services (e.g. health, education, social support).

3.2 Outcomes sought (to meet project objectives) – are these the investment objectives?

1. A revived and optimised Rail station and interchange with bus services (assumes it is compliant and safe, meets technical requirements that are relevant)

2. Providing a transport interchange for a range of transport modes that delivers minimum walking distances and connection times between modes that is consistent with the station hierarchy (Smarter Connections Strategy)

3. Protect and provide for the development of the Greater Wellington land for commercial purposes and enables for wider growth.

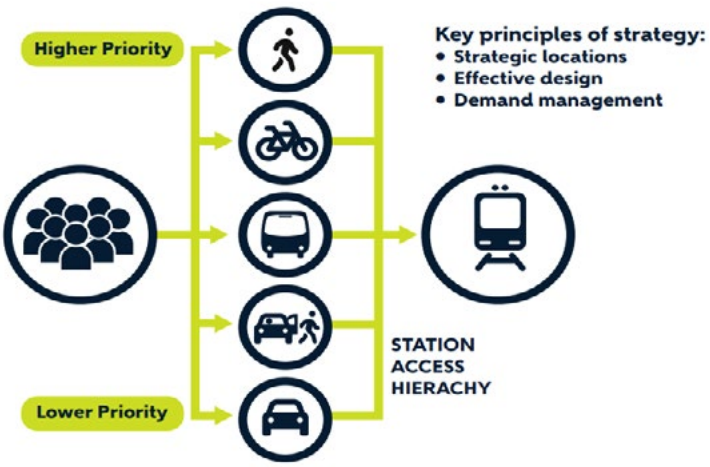


Figure 1: Station Access Hierarchy

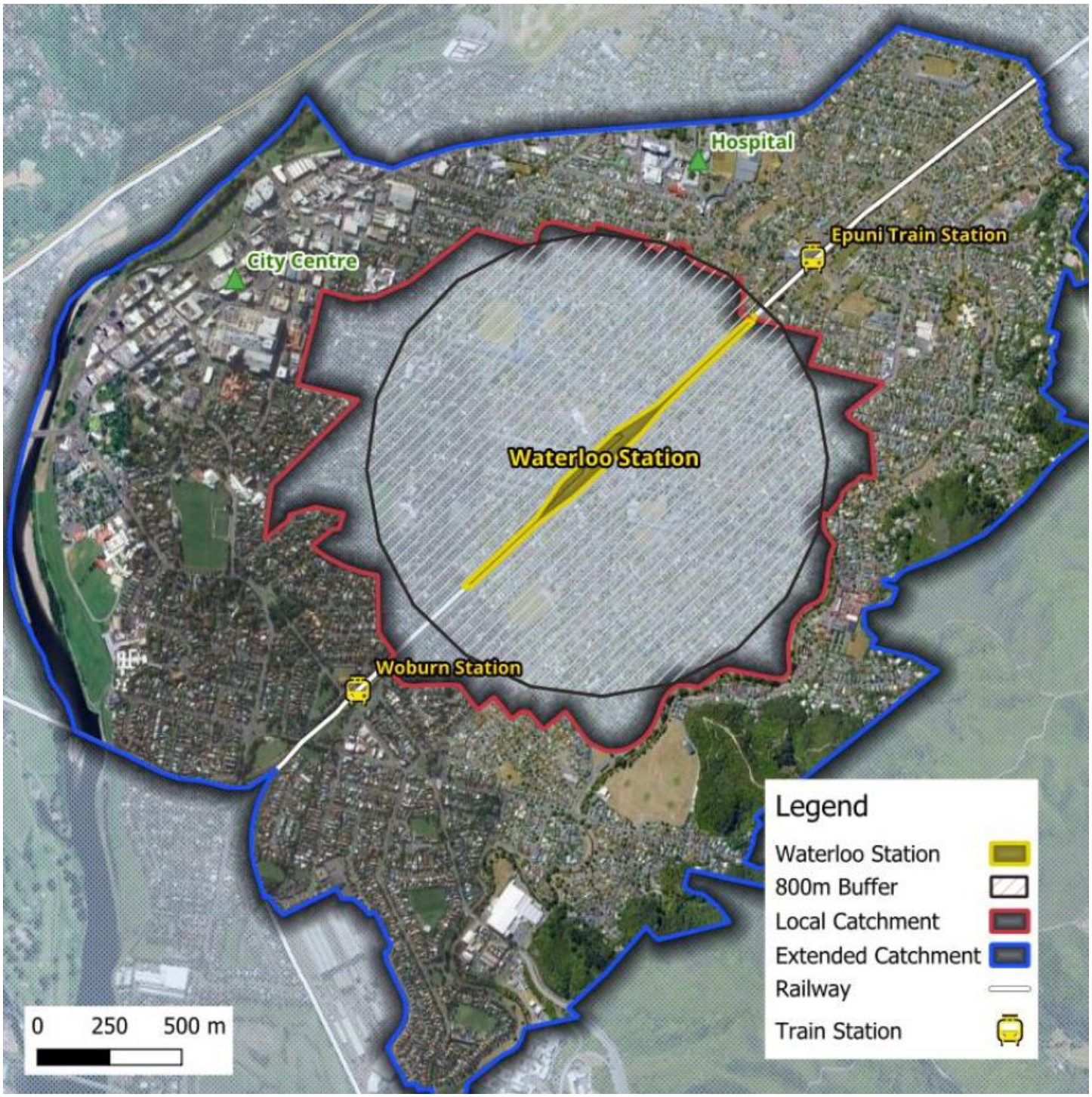


Figure 2: Waterloo Station and 800m catchment (source – Google Maps, Property Economics)

3.3 Project Objectives

CORE

A rail station and interchange for bus services and other active transport modes that:

→ Maintains a safe walkable connection across the rail corridor at Waterloo Station and Cambridge Terrace at all times, including during construction, for the community particularly school children walking to and from school.

→ Target durable lifespan for station – 30years or 50years?

→ Is demand led so that it provides sufficient capacity, targeting a Level C level of service for rail passengers in the peak 15 minutes in the representative week in the busiest month (excluding disruptions) in 2025 and forecast passenger demand in its planned opening year of 2030 and by 2045 and 2060.

→ Is affordable, where affordability is balance between the whole of life costs, including CAPEX, OPEX and finance costs of the rail station and the ability to be funded and paid for by taxpayers, ratepayers, users or a mix over its 30-year maintenance planning horizon.

→ Delivers value for money where this defined as the optimal balance between all of life costs and the technical requirements and level of service achieved in its opening year, 2045 and 2060.

→ Is cost-effective, where this the lowest all of life cost over a period of 30 years from its opening year.

→ Does not result in negative impacts on water quality or supply, from the structure, foundations and utilities servicing the rail station and interchange that are in the vicinity the Waiwhetū Aquifer, existing potable water infrastructure network and Waterloo Water Treatment Plant.

→ Has the smallest possible footprint (area and geometry) and avoids the need to use property in the immediate precinct (including property not under control of GW) for station operations so that it occupies a minimum land holding (having regard to forecast growth requirements), is decoupled from property not under control of GW and maximises the area of the land immediately adjoining the station for TOD related commercial and community uses.

→ Has a construction methodology that is simple and can be completed in the least number of months, therefore has a lower construction cost, and minimises the length of time that the rail network and users will be subject to construction impacts and disruptions.The preferred option is sufficiently evidenced, robust and justified to effectively engage, influence and secure investment funding from local government (ratepayers) and central government (taxpayers), users and the private sector.

DESIRABLE

A rail station and interchange for bus services and other active transport modes that:

Is a catalyst for transforming and intensifying the use of the urban area within an 800m walking catchment of the station. Thereby contributing to Wellington Regional Growth Framework (WRGF) objectives and goals in the Hutt Valley by supporting urban intensification and enhancement in Hutt City.

→ Attracts users by having the attributes of a civic and people centred space. Where those attributes include a space that is accessible and usable for all people, is safe and secure, has flexibility to accommodate a variety of activities and events, incorporates aesthetic and cultural elements such as art, landscaping and historical features.

→ Minimises or avoids environmental impacts and additional greenhouse gas emissions during construction and operation by maximising the reuse of existing infrastructure and building elements, disturbing or removing the least amount of earth needing disposal, achieving stormwater neutrality, using energy efficient building services and the use of PV panels for power generation.

→ Contributes to creating a Metlink design, look and feel for rail stations.

3.4 Investment Benefits

MONETISABLE

→ An uplift in property values surrounding the Waterloo Rail Station and bus interchange with 5 years of the opening of the revitalised station.

→ Reduced connection distances between transport modes and minimum connection times between scheduled services (e.g. bus to train) at Waterloo station compared to the 2025 baseline.

→ To maintain, at a minimum, existing patronage and fare revenue levels throughout the construction and commissioning phases of the project as measured from the date that construction starts.

→ Commercial rental income from Greater Wellington spaces within or adjacent the terminal providing services to commuters and the surrounding community.

QUANTIFIABLE BUT NOT READILY MONETISABLE (ALL OF THESE WILL CONTRIBUTE)

→ Social, economic and environmental benefits of a Transit Oriented Development as measured by:

→ An increase in population density from the 2025 baseline within an 800m walking distance of Waterloo Station.

→ An increase in economic agglomeration within an 800m walking distance of Waterloo Station and the Hutt City from the 2025 baseline.

→ The percentage mode shift from private motor vehicle to active modes and public transport in the region from the 2025 baseline.

→ An improved Customer Experience for station and interchange users from the 2025 baseline.

→ Growth in the patronage using Waterloo rail station and bus interchange from the 2025 baseline

QUALITATIVE BUT NOT READILY QUANTIFIABLE

→ Contributes to a reduction or avoidance of greenhouse gas emissions from a 2025 baseline.

4. OPPORTUNITIES AND CONSTRAINTS

Waterloo Station presents both opportunities and constraints for redevelopment.

The development of Waterloo station offers the opportunity to optimise public and crown land use around the station to establish an integrated public transport hub, harness the current popularity of public transport within the region and to create a station that better meets the needs of Lower's Hutt's growing population. There is also an opportunity to create a Waterloo station that enhances local identity and supports Greater Wellington's objectives for future transit-oriented development within the station precinct.

Constraints include fragmented land ownership hindering integrated development, the station's dated infrastructure and poor integration with surrounding areas, issues with accessibility and wayfinding, limited connection to other transport options, the proximity of Wellington Water's water treatment plant and existing car parking inefficiencies. The need to maintain station operations and pedestrian connections during external construction also poses a challenge.

Site Investigations in earlier stages of Waterloo TOD

A in depth analysis of the opportunities and constraints has been carried out in the previous stages I and II of the Waterloo Station TOD, these were associated with the following items and are included in Appendix C:

1. Decoupling Waterloo Station and Bus Interchange from the TOD
2. Waiwhetū Aquifer – source water risk management implications
3. Waterloo Train Station Canopy
4. Land Ownership

Site Investigations during Define and Discover Stage

The following section summarises these key opportunities and constraints identified by disciplines during Define and Discover Stage. A supporting comprehensive site analysis report, prepared by each discipline for the Opportunities and Constraints Workshop, is included in the Appendix C of this document.

4.1 Opportunities and constraints summarised by discipline

4.1.1 TRANSPORT

Opportunities

→ Walking access: Station location, street layout and topography mean that the station is highly accessible by foot

→ Walking access: Housing density changes will increase the number of people living within the catchment zone

→ Walking access: evidence shows that catchment areas increase in areas that are particularly pedestrian friendly and when the station environment is also pleasant

→ Cycling access: network of quiet streets around the station support cycling growth, station catchment increases significantly with cycling particularly with the increasing popularity of e-bikes

→ Cycle parking: high quality, secure and well positioned parking will support increased uptake along with on-street infrastructure changes to support safe direct access.

→ Bus: potential to consolidate current separate bus stops into a single, high quality location.

→ Bus: high potential to minimise transfer time to connecting rail services, from boarding point to boarding point, with bus facilities to be positioned as close to the platforms as possible.

→ PUDO (Pick up, drop off) access: re-purpose the existing parking area adjacent to the station as a dedicated PUDO and taxi area.

→ Park & Ride: Rationalising car parking and using demand management would encourage people to use more efficient transport methods. This would make better use of the station space, improve the area, and allow for development.

Constraints

→ Walking access: high speed roads at eastern station side, subway only access from eastern side, poor wayfinding and visual queues to station.

→ Cycling/micromobility: no offroad/dedicated cycle paths to the station, currently there is low demand for cycle parking at the station and there is a perception of poor station security for bikes

→ Bus access: no direct east – west road over rail connection for buses. Internal station circulation also leads to inefficient bus operations

→ Bus access: Similar bus volumes west/east of station – there is no clear dominant side for co-location of the bus stops without negatively impacting the majority of users

→ Bus access: Current location of taxi bays affects entry/exit of bus stops; limits stop capacity and negatively impacts bus operations.

→ PUDO (Pick up, drop off) access: no current PUDO so currently occurring informally, logical area for PUDO is currently being used for all day parking

→ Park & Ride: currently being used inefficiently- many users come from areas already well-served by buses or even live close enough to walk or cycle. This usage prevents people from further away who need the Park & Ride more from accessing it.

→ Park & Ride: Parking overflow is negatively impacting the surrounding streets.

4.1.2 CIVIL AND SERVICES ENGINEERING

Opportunities

→ Stormwater: Water sensitive design can be used to provide an inviting green space achieving hydraulic neutrality and demonstrate best practice.

→ Electrical & ICT: Adding a new substation will unlock future commercial development of the area.

→ Electrical & ICT: New site lighting will reduce unwanted behaviours and improve the station ambience.

Constraints

→ Water assets: Waterloo Water Treatment Plant proximity and associated pipe work (large diameter and aged in parts).

→ Stormwater: Re-development will trigger requirements for hydraulic neutrality and water sensitive design. These elements have spatial consideration, such as raingardens (to ensure 90% treatment of dissolved metals) and 1% AEP attenuation.

→ Flood extents: Waterloo station sits above the 100 year flood levels. However, the GWRC Flood Hazard Area Maps shows some flooding to the NW edge of the WWL compound in a 440 year event (ie River stopbank breached).

→ Electrical & ICT: Limited spare electrical capacity for expansion or development, a new substation required if the demand is doubled.

4.1.3 URBAN DESIGN AND LANDSCAPE

Opportunities

→ There are frequent through movements through the station, underpass provides a key community through connection from one side of the suburb to the other

→ Urban development: Create public safe, accessible connections across rail and increase visual permeability across station/rail. The movements provide passive surveillance.

→ Urban development: opportunity to create new public spaces at the station by reconfiguring station layout and parking

→ Landscape: Enhance views through station to connect across centre and enable aspect to hills to orientate to place.

→ Landscape: inserting 'green' islands into station and immediately adjacent, creating a connector to Trafalgar Square

Constraints

→ Urban development: Rail and road corridors divide the suburb - visually and physically.

→ Urban development: surface car parking isolates station and makes no contribution to business activity

→ Landscape: the area is dominated by 'hard spaces' - roads and carparks that contribute to the urban heat effect.

→ Land Ownership- KiwiRail, Greater Wellington, Hutt City Council

4.1.4 GEOTECH AND STRUCTURAL ENGINEERING

Constraints

→ Geotech: Founding conditions – suitable founding layer; variability of Lower Taita Alluvium; soft ground Upper Taita Alluvium

→ Geotech: potential for contaminated soil and cost of disposal

→ Structures: Space truss (existing roof) is in a state of disrepair so will need expensive repairs or demolition. The space frame will be difficult to demolish compared to a conventional roof.

→ Structures: Existing foundations already in ground, including existing subway which may influence the position of any new foundations

Opportunities

→ Geotech: shallow piles can be used for a larger building with distributed bracing

→ Structures: opportunity to reuse existing foundations to be explored

4.1.5 ARCHITECTURE

Opportunities

→ Improve station legibility within the street hierarchy — its location and street frontage provide an opportunity for a stronger civic presence

→ Street frontage provides an opportunity for commercial development within the station footprint – allowing for station activation and revenue generation,

→ Repositioning the signalling shed could enable platform alignment, to improve station configuration and planning, legibility as well as improving passenger movement

→ Ability to add station closure line (protection of assets and potential revenue protection)

Constraints

The current station is reaching the end of its design life, with key compliance challenges as well as provision of certain amenities expected at the modern / major interchange.

→ Stairs and ramps are no longer compliant with D1 Building Code requirements.

→ Safe bike storage facility.

MAPPING

See opposite page for summary constraints diagram

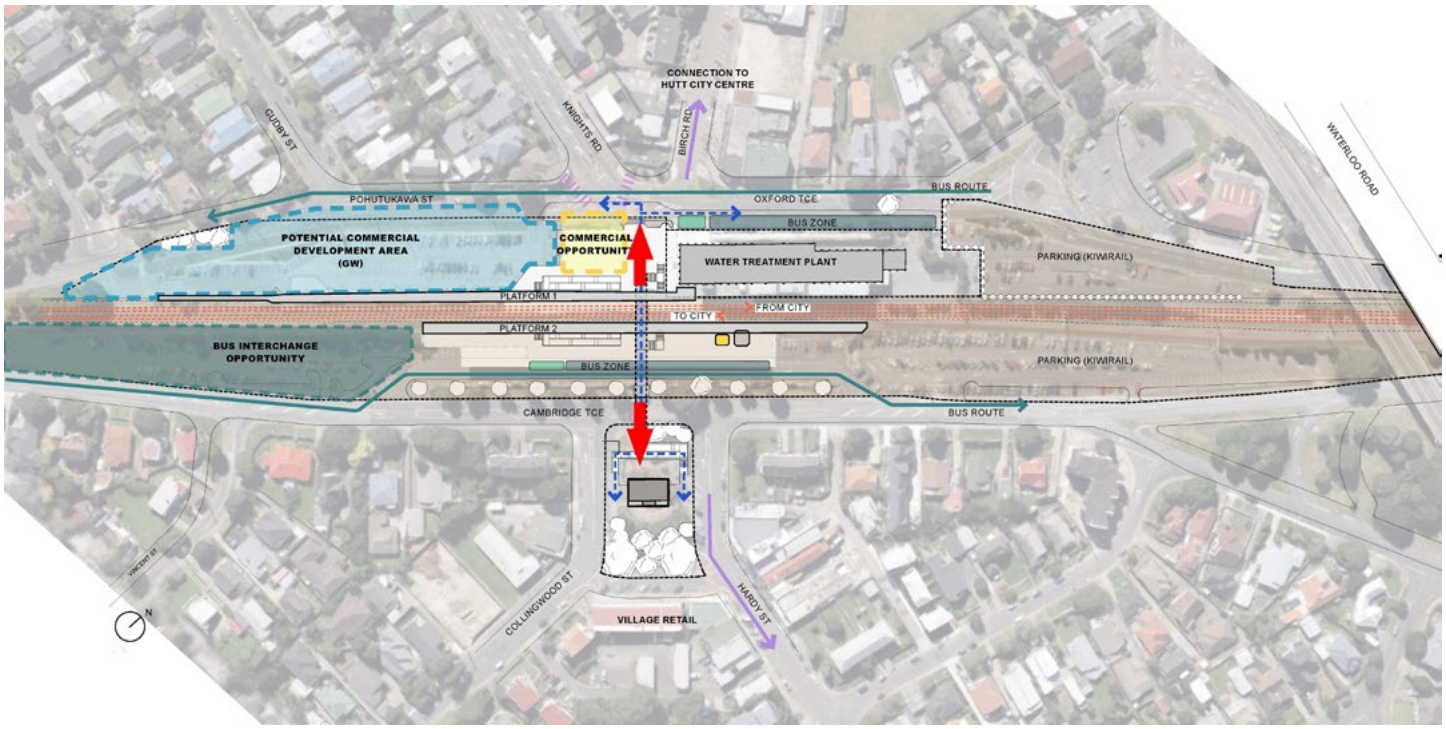


Figure 3: Key constraints summary

5. FORECAST DEMAND: ESTABLISHING BASIS OF DESIGN

This section provides the first round of station sizing calculations to support the optioneering stage of the Waterloo Station rebuild. It outlines the methodology used to estimate future demand and defines infrastructure requirements to ensure the station is appropriately scaled for forecast use. This work has been developed with support from Wellington's Transport Analytics Unit (WTAU), and Metlink's Strategy and Funding team.

The design year for this assessment is 2046 (15 years after assumed opening date), with sizing based on anticipated peak passenger volumes during that period. Additional futureproofing is considered for the 2061 horizon to ensure scalability of key infrastructure elements.

5.1 Forecasting future passenger demand

Waterloo is a strategically important station within the regional network. Despite a recent softness in passenger numbers across the rail network, there are a number of factors that will lead to substantial growth in patronage at Waterloo Station in the medium to long term. This includes:

- → Significant uplift in housing numbers within the direct catchment of Waterloo Station, with new, denser housing already built or planned
- → Wider growth (e.g. Wainuiomata) increasing patronage on feeder bus routes
- → Integrated fares and ticketing that will be enabled through the introduction of the National Ticketing System which is likely to drive increased demand, including fare integration across modes, capping, and potential for a distance-based fare structure.
- → LIMRIM and other planned investment will also increase frequency and reliability, as well as quality of rolling stock
- → Understanding this growth is critical to ensure that a rebuilt Waterloo Station is fit for purpose to meet future demand – and to futureproof where required to avoid inefficient investment or oversizing of some station elements (e.g. lifts, stairs, platforms).

These factors will drive higher demand for rail services and reinforce the importance of ensuring Waterloo Station remains fit for purpose through its next generation of use.

5.1.1 CURRENT DEMAND AND SNAPPER DATA INSIGHTS

To establish a robust baseline, Snapper data for the week of 11–17 March 2024 was analysed, covering the morning peak (06:00–09:00) and evening peak (15:00–18:00). This period falls within the 95th percentile of annual usage and is considered representative of high network demand.

Data from Monday and Friday was excluded due to lower travel volumes typically associated with work-from-home patterns. Weekend data was also excluded. The analysis therefore focuses on the Tuesday to Thursday average, offering a clearer view of typical weekday commuter patterns.

Key findings:

- → Passenger flows are strongly tidal, with high inbound demand in the morning (toward Wellington CBD) and outbound demand in the evening
- → The Hutt Valley Line (HVL) carries the majority of passengers due to its higher service frequency relative to the Wairarapa Line (WRL)
- → Snapper boarding and alighting profiles were used to inform arrival and departure patterns and peak load conditions

5.1.2 FORECASTING FUTURE DEMAND

Passenger forecasts were sourced from the Wellington Strategic Demand Model, as well as historical Snapper data to understand growth rates. These were used to estimate demand on both inbound and outbound platforms during the morning peak.

The per annum growth rates from were used to interpolate the growth for the 2046 Design Year and extrapolate the 2061 Ultimate Design Year. As growth rates for the modelled data were applied to the existing Snapper data, growth was re-based to the year 2024 rather than the 2018 model base year.

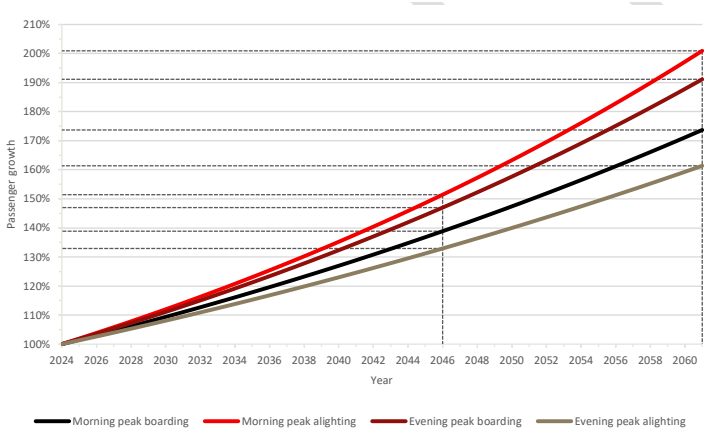


Figure 4: Waterloo Station passenger growth rates

The resultant growth rates are shown in Figure 4, and show the highest growth rates for alighting in the morning peak and boarding in the evening peak which correlate with the aspiration of Waterloo becoming a growing destination.

Applying the growth rates from Figure 4 to the existing Snapper data for the average peak weekday, results in the Design Year and Ultimate Design Year passenger demands in Table 1 and Table 2

	2024		2046		2061	
Line	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
HVL (Inbound)	1702	131	2364	198	2957	263
WRL (Inbound)	167	25	232	38	291	50
Inbound Total	1869	156	2596	236	3248	313
HVL (Outbound)	144	40	200	61	250	81
WRL (Outbound)	2	3	3	5	3	6
Outbound Total	146	43	203	66	253	87

Table 1: Design Year and Ultimate Design Year morning 3-hour peak passenger demands by line and direction

	2024		2046		2061	
Line	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
HVL (Inbound)	90	122	133	163	173	197
WRL (Inbound)	0	0	0	0	0	0
Inbound Total	90	122	133	163	179	197
HVL (Outbound)	145	1423	213	1892	277	2297
WRL (Outbound)	20	107	29	142	38	173
Outbound Total	165	1530	242	2034	315	2470

Table 2: Design Year and Ultimate Design Year evening 3-hour peak passenger demands by line and direction

5.2 Station Sizing

The station has been sized using the upper-bound growth scenario (Sense Partners), which accounts for the influence of the Waterloo TOD on local employment and population, as well as land use uplift expected in the station halo.

This aligns with local growth expectations and land use planning, and supports a demand-led infrastructure approach. While Stats NZ projections may need to be used for NZTA business case economics (if required), the Sense Partners scenario is better suited for infrastructure design decisions.

Station infrastructure has been sized to:

→ Accommodate opening year (2031) and design year (2046) demand

→ Provide Level of Service C or better during the peak 15-minute period of the busiest week

→ Allow future expansion to 2061, where required, to manage targeted congestion or increased throughput

Design elements most likely to experience future constraints (e.g. stairs, underpasses, Snapper gates) are explicitly sized for upgrade flexibility.

Note For the busiest 15 minute of the day (17:30-17:45), with a delayed train service there may be a lower level of service for a short period of time from the 2040s onwards, with the remainder of the day performing at a LOS C or better.

Figure 5 illustrates the proposed station sizing outcomes for Waterloo Station, with key infrastructure elements dimensioned to achieve Level of Service (LOS) C or better through to the 2046 design year under normal operating conditions.

The graph below illustrates how the level of service is expected to degrade over time as demand increases. As the LOS degrades, it signals a trigger point where interventions—such as widening stairs or underpasses—may be warranted to maintain an acceptable level of service.

Please see the full Pedestrian modelling memo for further information on all station elements.

	MINIMUM PROVISION		
Station element	**Design Year**	**Ultimate Design Year**	**Delta (Ultimate Design Year – Design Year**
Inbound platform width	5.0 m	5.0 m	0.0 m
Outbound platform width	5.0 m	5.0 m	0.0 m
Inbound platform Snapper card scanners	4 scanners	4 scanners	0 scanners
Outbound platform Snapper card scanners	7 scanners	9 scanners	+2 scanners
Inbound platform staircase width	2.2 m	2.7 m	+0.5 m
Outbound platform staircase width	3.4 m	4.2 m	+0.8 m
Oxford Terrace Station Forecourt staircase width	6.1 m	7.5 m	+1.4 m
Station underpass width	3.0 m	3.6 m	+0.6 m
Cambridge Terrace underpass width	1.8 m	2.0 m	+0.2 m

Table 5: Design Year and Ultimate Design Year evening 3-hour peak passenger demands by line and direction

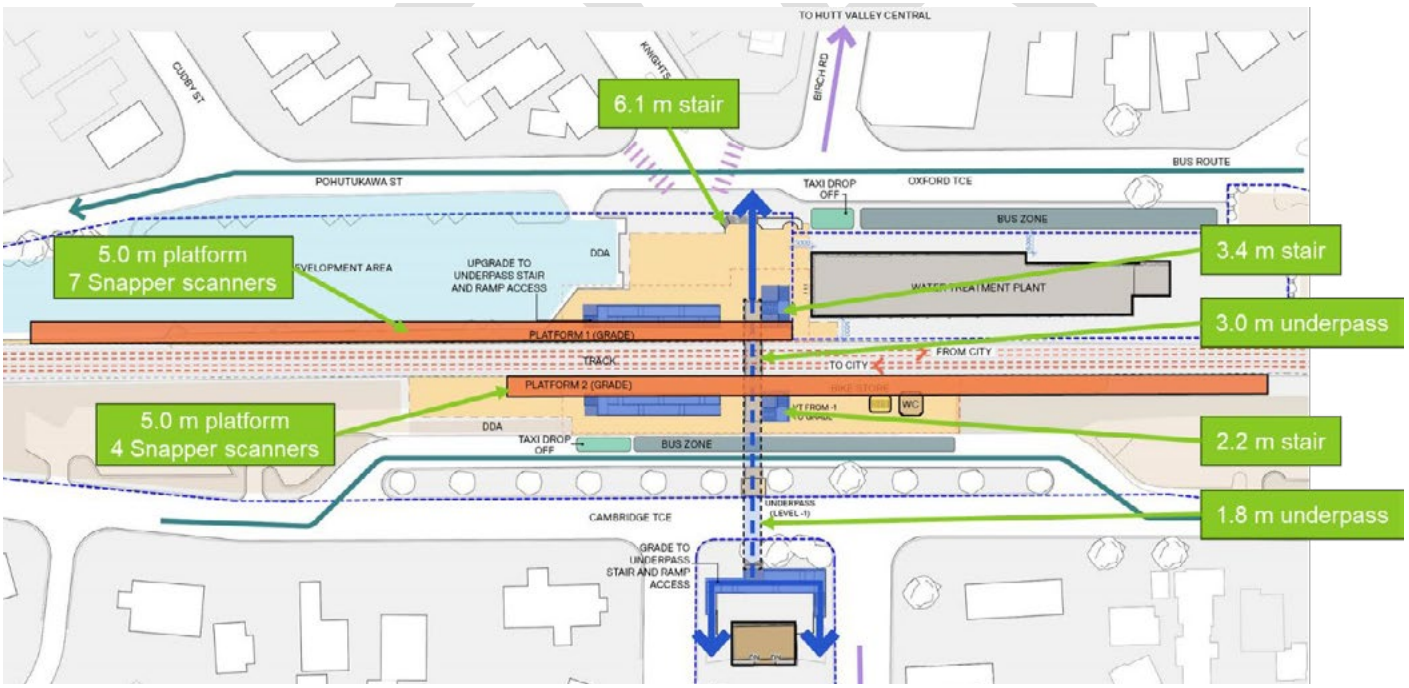


Figure 5: Station sizing to achieve a LOS C or better (2046 design year)

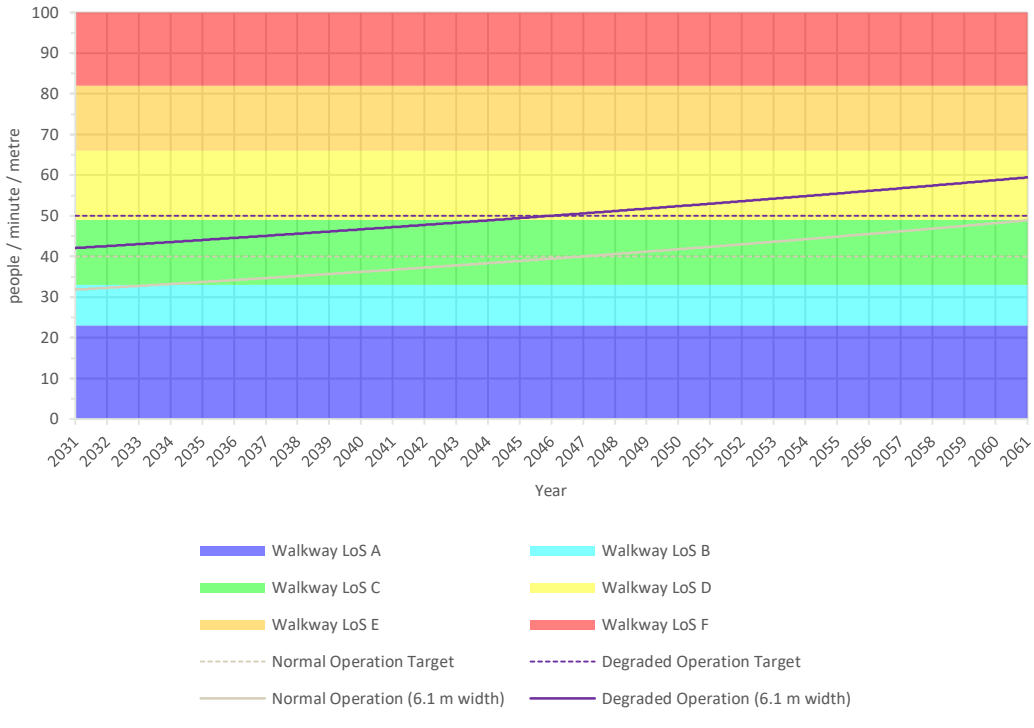


Figure 6: Example of LOS over time for the underpass at Waterloo Station

6. TECHNICAL USER REQUIREMENTS

6.1 Capturing / Identifying Technical Requirements

The Waterloo station reference design scope and technical requirements need be captured and documented to satisfy the ownership and operational requirements needed for the station. The documenting needs to have input from Greater Wellington, as the station owner and operator, with input and agreement from other key TOD stakeholders. At a minimum it should contain:

→ Historical and 30yr forecast passenger demand for train and bus (if possible peak hour passenger departures and arrivals).

→ Rolling stock and bus operator requirements (Metlink)

→ Station owner and operator requirements (Metlink)

→ Railway corridor technical requirements (KiwiRail)

→ Local Council Authority Requirements (HCC)

→ Other Key stakeholder requirements

6.2 Existing Station (refers to agreed demands)

The station is currently used by a weekday average of 14,500 passengers per week and is the third busiest station on the Wellington rail network. The proposed rail station and bus interchange would interact with the Hutt Valley train line, the Wairarapa Connection train line and current bus routes 121, 130, 150, 160, and 170. In the future, On Demand services could also provide local connections to Waterloo.

Waterloo Station sits between Oxford Terrace and Cambridge Terrace in Lower Hutt, covering approximately 32,000m2. The station includes:

→ Approximately 4,700m2 space frame roof structure covering the station covering the station's main platform and atrium areas.

→ Previous NZ Bus Office Building.

→ Toilet building

→ Waiting Room and Coffee Kiosk

→ Platform shelters

→ Numerous light, signage and CCTV assets

→ 6 Park and Ride areas consisting of 18,865m2 of land area containing 780 number of spaces.

→ Bike parking facilities, providing 50 total spaces, including 22 cycle lockers, 20 2-tier racks, and 1 toaster rack.

→ Subway and associated sump pump, ramps, walkways and stairs.

6.3 Design Drivers

SAFETY

→ Providing a safe environment through Crime Prevention Through Environment (CPTED) design for the station infrastructure assets.

→ The design includes features like clear and uniform announcement systems and tamper-proof philosophies to ensure a safe environment for station users and their belongings.

PROTECT THE WAIWHETŪ AQUIFER

→ Limit foundation incursion through deep layers, limit foundation demands, limit weight (structural & other), materiality, height/ number of stories, and limit bracing demands.

→ Avoid disturbance of key infrastructure in and around the site.

CONNECTIONS

→ The design emphasises seamless and safe links between different modes of transport, including bus, train, walking, cycling, micromobility, and the surrounding community.

→ A safe, initiative and efficient rail corridor crossing point at Waterloo Station for pedestrians, particularly school aged children.

PLACES FOR PEOPLE

→ Using universal design to ensure that the station and interchange is fit for purpose for all station users.

→ A building services design that enhances passenger comfort and amenity.

→ Horizontal weather protection vs. vertical weather protection. The provision of less roof area equals less total wind force resisted by foundations, therefore consider opportunities for offset wind barriers at person height scale.

→ A design that aims to provide a modern, safe, and intuitive wayfinding system that enhances the overall user experience.

EASE OF MAINTENANCE

→ Infrastructure and systems should be simple, common and generic, so that they are easy to maintain.

→ Materials and fit-out should be long-lasting, hard-wearing and functional to achieve a minimum 30 year lifespan.

→ Ensuring we can provide a clean, comfortable, and accommodating station and interchange environment, and keeping our station infrastructure assets free of graffiti and vandalism.

SUSTAINABILITY

→ Explore reuse of existing foundations, materiality choices (limit concrete/promote timber), upfront vs. life cycle carbon (structure vs. servicing), and ascertain building importance level

→ Limit the amount of historic (likely) contaminated soil needing disposal and consider options that limit bulk change in levels

→ Incorporating water-sensitive landscape architecture and civil infrastructure solutions that are consistent line with current standards and best practices.

→ The use of energy efficient building services and the use of PV panels for power generation.

FLEXIBILITY

→ Consider placement of structure with respect to existing conditions, sequence of demolition vs. rebuild vs. temporary condition, and stay aware of any identified exclusion zones.

→ Designing for future capacity and flexibility to accommodate increased patronage and transport network changes.

→ Station design protects for future development. i.e. electric bus charging.

→ Opportunities to stage the development of the rail station and bus interchange so that its construction can be demand led as the forecast demand eventuates.

RESILIENCE

→ A station design that achieves an importance level of 2 (IL2)

→ The provision of building services that protect for life safety for a suitable period of time during and after an event.

6.4 Proposed Station Summary of Key Technical Parameters

ELEMENT	PARAMETER	BASIS / REFERENCE
INSIDE STATION		
Platform Length	190m	GWRC Minimum Requirements
Minimum operational platform width – Side platforms	3m - 5m	Waterloo Static Sizing Assessment GWRC Minimum Requirements
Minimum operational platform width - Island	9.6m	AT Engineering Design Code
Revenue control - readers	8 Snapper readers	Waterloo Static Sizing Assessment
Revenue control - Snapper top up	2 top up machines (noting transition to contactless / paywave will reduce demand for top ups)	Waterloo Static Sizing Assessment
Waiting space - shelter	247m2	GWRC Minimum Requirements
Waiting space - seating	60 seats (min)	GWRC Minimum Requirements
Public toilets	1 x fully accessible bathroom with minimum of four toilets Changing table (check the accessibility standards reference)	GWRC Minimum Requirements NZBC (G) Minimum Requirements
Real Time Information	Yes	Metlink Asset Management Plan GWRC Minimum Requirements
Duress & Customer help points	Yes	Metlink Asset Management Plan GWRC Minimum Requirements
Wayfinding, Signage and Passenger Information (PIDS)	Yes	GWRC Minimum Requirements
Public Address System	Yes	GWRC Minimum Requirements
Platform fixtures, fittings and furnishings	Yes Bins Seating	Metlink Asset Management Plan GWRC Minimum Requirements
STATION INTERCHANGE		
Bus layover bays	2	GWRC Minimum Requirements
Bus stops	10 (note this requirement may lessen depending on the options progressed)	Aurecon Assessment GWRC Minimum Requirements
Accessible Parking Bays	16 (minimum)	GWRC Minimum Requirements
Emergency Vehicle Parking Bay	1	Station Best Practice / AT EDC
Maintenance vehicle parking bay shared with refuse truck bay	1	Station Best Practice / AT EDC
Bus Shelters/waiting		
Stairs – outbound platform	See Station Sizing Section	Waterloo Static Sizing Assessment
Stairs – Oxford Tce	See Station Sizing Section	Waterloo Static Sizing Assessment
Underpass	See Station Sizing Section	Waterloo Static Sizing Assessment

ELEMENT	PARAMETER	BASIS / REFERENCE
Escape paths		
Ramps	See Station Sizing Section	Waterloo Static Sizing Assessment
Ramps	Slopes – 1:20 without handrails, or 1:12	
PLANNING / PUBLIC REALM		
Low Impact Stormwater Design	Key parameters and requirements include: Hydraulic neutrality for the 1%AEP (1 in 100 year) event for the site - including parking areas – built into landscape response. Water quality targets – 90% treatment of dissolved metals (copper & zinc) through incorporation of water treatment devices within the site.	Regional Standard for Water Services, Wellington Water Limited Stormwater Management Strategy, Wellington Water Limited Water Sensitive Design for Stormwater: Treatment Device Design Guideline, Wellington Water Limited Plan Change 1 – Natural Resources Plan for the Wellington Region, Greater Wellington Regional Council
Public connections (across rail corridor)	Direct and accessible (suitable for wheels) through station connection	
Public connections (across local streets)	Suburban Residential Neighbourhoods Max 30kph street speeds High level of walkability to local destinations within the neighbourhood and nearby, including public transport stops and stations Narrower carriageways provide street spaces with higher amenity	NZTA Aotearoa Street Guide (ref Suburban Residential Neighbourhood typology
Bike Parking Formats	Protected/secure types: Corrals & docks, Lockers & hangers, Sheds & shelters, Cages & rooms and Bike stations. Located well trafficked / highly visible locations, close to on - site security, locked/restricted access, with CCTV cameras as deterrent. Integrate with other structures to reduce risk of generating places of concealment	NZTA: Cycle parking planning and design Cycling Network Guidance technical note – ref Table 6 for parking types.
Bike Parking Numbers	Number of Hutt City residents that cycle to work and study from 1.6% in 2018 to 5% in the 2038 (as measured by NZ Census). Current bike parking (50 spaces) is 3% of peak alighting. For modelled 2053 (2010 peak alighting) at 5% bike trips to station (as a proxy for any other measure at this time) = 100 spaces. Centre destination station (Type 4) or multi-modal park and ride facility (Type 5) 60-100 cycles.	Hutt City Cycling and Micromobility Hutt City Cycling and Micromobility SSBC (2021) Auckland Transport Public Transport Rail Infrastructure Engineering Design Code

ELEMENT	PARAMETER	BASIS / REFERENCE
Shelter	Sun access to provide passive solar warmth with east/west aspect relative to waiting space orientation and am/pm peaks Weather shelter between bus and rail on/off boarding	
Car Parking (for Commercial Development)		Cam to add from District Plan AS/NZS 2890.1
Other relevant District Plan parameters – heights etc		Cam to add from District Plan
BACK OF HOUSE/SERVICES REQUIREMENTS		
Waste Management compound	confirm	confirm
Building Services plant spaces including communication rooms	Yes – requirement of space subject to the station design and nature of the space. Ease of maintenance for plant and associated kit.	GWRC Minimum Requirements for maintenance. Utilises safety in design principles.
Electrical substation	Subject to design power requirements	Wellington Electricity standards
Photovoltaics	Yes	GWRC Minimum Requirements
General lighting, emergency lighting, feature lighting	Yes	GWRC Minimum Requirements GWRC Lighting Standards - Rail NZBC F6
100% CCTV coverage	Yes	Metlink Asset Management Plan GWRC Minimum Requirements
Public Address System	Yes	GWRC Minimum Requirements
Wi-Fi Hearing Assistance	Yes	GWRC Minimum Requirements
Data/ ICT requirements	Yes – data and ICT connectivity required to facilitate use of systems in the station. The final provision/ supply for this is subject to future design.	GWRC Minimum Requirements
Ventilation, heating and cooling	Yes	NZBC G4 Minimum Requirements
Energy efficient building services	Yes – where applicable	NZBC H1
Stormwater Drainage.	Stormwater Drainage to meet required Level of Service e.g. avoid ponding and good client experience. Design is to also meet compliance requirements.	NZBC E1 Wellington Water's Specification and Standards GWRC Minimum Requirements
Water & Wastewater Drainage	Service connections to meet industry standards	NZBC Wellington Water's Specification and Standards
Existing Services	Disruption of existing water & wastewater services operated by Wellington Water is to be avoided	Wellington Water's Specification and Standards GWRC Minimum Requirements

GWRC TO CONFIRM CLARIFICATIONS	
MIN REQ. SECTION / REQUIREMENT	**PROPOSED CLARIFICATION / AMENDMENT**
The line operates at a 20-minute frequency between 9am until 3pm, with a higher frequency during the morning and afternoon peaks.	Confirm if timetable operations are based on current or future timetable. i.e. if frequency's change could this impact LOS / programme
Buses Replacing Trains -	Does this need to be a specific side of the tracks (i.e. North / South bound) Check if based on current / future demands, could this change with future integration with bus interchange.
The Bus design standards referenced in the document (p17) is appropriate for a single bus stop, as opposed to a bus interchange. Designing to these standards would result in 2 x 50+ metre bus stop lengths to accommodate all buses which would be inappropriate for the setting and an inconvenience for passengers. The same comment applies to the BRT stops which alone would require 60+m for 3 buses.	We propose to use NZTA's PTDG to inform design, as well as our knowledge and experience designing station interchanges. We will test a range of options for bus stop configurations, including double stops, super stops and a single combined facility, taking account of the need to protect smooth bus operations, balanced with the space constraints and customer needs.
Minimum requirements generally silent on requirements during construction. Section 2 outlines key strategic outcome as 'To maintain, at a minimum, existing patronage levels throughout the construction and commissioning phases of the project' But limited further detail provided.	Clarify requirements for appropriate LoS to maintain existing patronage during construction and commissioning if station is keep open (e.g. length of platform, number of seats. PA, lighting, etc.) Need to confirm what LoS can be achieved during construction and how that compares to LoS required
Maintain at a min. existing patronage level throughout the construction and commissioning phases of the project.	Define extents of station area to remain open / If a reduced patronage level is feasible
Minimum requirements is for space for 32 bikes at Waterloo station. This is a reduction from current provision of ~50 spaces	Although current cycle access to the station is low, space for up to 60 spaces should be allowed for in the design, to cater for future growth in demand. This can be delivered incrementally if required
The platform width will have a minimum of 5m.	The static sizing assessment indicates that a platform width of 4.4m would be sufficient to accommodate future demand at the busiest point. AT Guidance and CRL station guidance use a platform width of 4.5m
Waterloo Station Interchange will provide a space for driver facilities for short layovers. This shall be separate from public areas. There shall be an area of at least 3.6 m x 2.5 m where a future layover spot for drivers can be located where drivers take rest and meal breaks.	There are currently no bus layover bays and we are not aware that there is a requirement for bus or train driver facilities. The document refers to two potential layover bays for futureproofing. Please confirm if driver facilities (eg toilets, locker, lunch / break room) is a minimum requirement.
Ticketing Facilities	In design team meetings, we have discussed the desire for passive provision for gate lines, if / when they are required in future. Please confirm if this is a minimum requirement
Bus stop requirements: Looking at future requirements out to 2041, and making allowance for possible new services (fixed route or on demand) this minimum requirement could increase to space for 10 buses.	Based on our assessment of the future service patterns, we believe that bus operations may need less than 10 stops, with a maximum of X stops. This takes into consideration future demand responsible bus services. 2 layover stops would be in addition to this.

GWRC TO CONFIRM CLARIFICATIONS	
MIN REQ. SECTION / REQUIREMENT	**PROPOSED CLARIFICATION / AMENDMENT**
The design of the Waterloo Station Interchange shall ensure that electric bus charging equipment can easily be installed in the future. This shall include installing electrical ducting and creating sufficient capacity in the interchange layout to accommodate the installation of plug-in electric bus charging facilities. The extent of electrical ducting and the bus charging infrastructure to be considered shall be agreed with Metlink and GWRC.	GWRC approach to charging of the electric bus fleet is through dedicated charging facilities at depots as opposed to stations such as Waterloo where space is at a premium. We recommend the client reconsider the applicability of the clause for this application. Can this clause be removed?
Operations and Maintenance Requirements for bus operations during construction.	Once options are developed suggest meeting with MetLink and transport engineers to understand what bus stop can be provided and requirements during construction.
Importance Level	We are suggesting classification as IL2 as baseline, i.e. not “principal station”
Waiting space - shelter	Confirm if this is split between conditioned (weatherproofed) and open shelter. Are circulation spaces (i.e. subway) considered shelter.
Revenue control - futureproofing	Passive provision for gate lines
Station closure (asset protection)	

APPENDIX

Appendix A: Benchmarking Summary

Appendix C: Site Investigation Report and Constraints

Appendix D: Brief Development - Key Themes, Principles and Objectives

Appendix E: Benchmarking Presentation

APPENDIX A
BENCHMARKING SUMMARY

Benchmark Stations

- Waterloo Station's 2024 entries and exits 1,100,000 (or 550,000 unique passengers). Peak hour flow is ~1,300 pax
- For our design year (2046), this is forecast to be approximately 1,500,000 annual entries and exits at Waterloo in 2046 (or 750,000 unique passengers). Peak hour flow is ~1,700

Civic Benchmarks

Civic Benchmark	Features of note	Passenger Demand	Est. Construction Cost. (Current NZD Equivalent)
Drury Station Phase 1 (Day 1) - Auckland 	Current Phase: In construction – 2024/2025 Comparative scale to Waterloo Station. Split Platform	AM peak hour flow 532 (2028) b-439 a-93	$50M-$60M
Drury Station – phase 2 (2036) (Future Arrangement) - Auckland 		AM peak hour flow 1,889 (2048 – design year) b-1430 a-439	

Ormond Station (Melbourne, Australia) 	Current Phase: Complete grade separated with rail under road.	Average pax AM Peak (7-9.30am) FY 2023-24 650 Pax PM Peak (3-7pm) FY 2023-24 300[1]	$300M-$500M *station component $40million AUD* *overall project $130Million AUD Approximate only*
Gardiner (Victoria, Australia) 	Current Phase: Complete 2017 grade separated with rail under road Glen Iris, Melbourne. Part of $524M total project	Average pax AM Peak (7-9.30am) FY 2023-24 600 Pax PM Peak (3-7pm) FY 2023-24 300[2]	$40M-$50M *station component $35million AUD* *overall project $130Million AUD Approximate only*
Nunawading 	Current Phase: Complete Grade separated station with rail under road Civic gesture of a canopy used to indicate entrances, wayfinding and legibility.	Average pax AM Peak (7-9.30am) FY 2023-24 1050 Pax PM Peak (3-7pm) FY 2023-24 500[3]	$200M-$300M *station component $30million AUD* *overall project $130Million AUD Approximate only*
New Lynn – Auckland 	Current Phase: Complete 2012 Consideration of scale relative to pax numbers, a consideration for safety.	Average daily boarding count 2023-2024 2900[4]	$50M-$60M

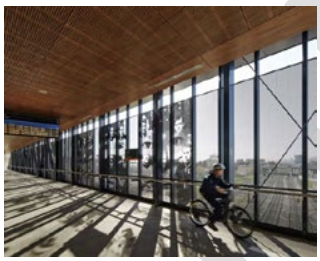
[1] **Melbourne metropolitan train station patronage data sourced from:** https://discover.data.vic.gov.au/dataset/annual-metropolitan-train-station-patronage-station-entries/resource/57faf356-36a3-4bbe-87fe-f0f05d1b8996

[2] **Melbourne metropolitan train station patronage data sourced from:** https://discover.data.vic.gov.au/dataset/annual-metropolitan-train-station-patronage-station-entries/resource/57faf356-36a3-4bbe-87fe-f0f05d1b8996

[3]

[4] **Auckland rail patronage data sourced from**: **https://fyi.org.nz/request/27853-rail-patronage-data-by-station**

Bridge Benchmarks

Bridge Benchmark	Features of note	Passenger Capacity	Est. Construction Cost. (Current NZD Equivalent)
Ringwood (Australia) 	Interchange at grade station. Includes bus interchange and combined public/commuter cross corridor overbridge Similar form of site (long and narrow)	Average pax AM Peak (7-9.30am) FY 2023-24 1600 Average pax PM Peak (3-7pm) FY 2023-24 1450[5]	$60Million. AUD Approximate
Pukekohe - Auckland 	Bus & Train Interchange Upgrade Overpass bridge, integration of co-design and heights of screening over bridges for customer safety, security and maintenance.	Rail station boardings 2019, daily average 269*** (Station closed in 2022 and re-opened after electrification 2025)[6]	$15M-$20M
West Footscray 	Good example of a bridge based public connection – has a ramp and division between the different modes, e.g. cycling, pedestrian, micro-mobility; has a mesh screen) 2013 rebuilt. Third platform added 2020	Average pax AM Peak (7-9.30am) FY 2023-24 1050 Average pax PM Peak (3-7pm) FY 2023-24 300[7]	$20M-$30M

[5] **Melbourne metropolitan train station patronage data sourced from:** https://discover.data.vic.gov.au/dataset/annual-metropolitan-train-station-patronage-station-entries/resource/57faf356-36a3-4bbe-87fe-f0f05d1b8996

[6] **Pukekohe, Auckland rail patronage data sourced from**: **https://www.greaterauckland.org.nz/2019/09/11/2019-rail-station-boardings/**

[7] **Melbourne metropolitan train station patronage data sourced from:** https://discover.data.vic.gov.au/dataset/annual-metropolitan-train-station-patronage-station-entries/resource/57faf356-36a3-4bbe-87fe-f0f05d1b8996

Tawa – Wellington 	Example of Minimum Viable Product for a bridge crossing. Novak & Middleton (Architects) Excluding bridge works	Estimated AM Peak hour patronage, (06:00-8:30am) 2019, 235[8]	$2M-$3M

Underpass benchmarks

Underpass Benchmark	Features of note	Passenger Capacity	Est. Construction Cost. (Current NZD Equivalent)
Birkerod Station (Denmark) 	Island platform configuration with escalators and lifts. Pedestrian underpass. Simple, legible design with robust and high quality materials	Average passenger number per day 2008, 4,402[9]	$50M-$60M
Aircraft Station (Melbourne, Australia) 	Refurbished station with side platforms. Enhanced pedestrian underpass utilising ramps and stairs integrated into a landscaped forecourt/entry.	Average pax AM Peak (7-9.30am) FY 2023-24 300 Average pax PM Peak (3-7pm) FY 2023-24 150[10]	$15M-$20M

[8] Wellington, Tawa station: **https://www.gw.govt.nz/assets/Documents/2009/10/2009_445_1_Report.pdf**

[9] Birkerød railway station **patronage data sourced from: https://en.wikipedia.org/wiki/Birker%C3%B8d_railway_station**

[10] **Melbourne metropolitan train station patronage data sourced from:** https://discover.data.vic.gov.au/dataset/annual-metropolitan-train-station-patronage-station-entries/resource/57faf356-36a3-4bbe-87fe-f0f05d1b8996

Bowen place Crossing (Canberra, Australia) 	Road bridge with pedestrian and cyclist underpass. Generous underpass width, integrated landscape and robust materials.	N/A	$30M-$40M
Essendon Station (Melbourne, Australia 	Refurbishment of existing subway to improve amenity, access and safety. Integrated landscape response to change in levels. Connection to bus interchange	Average pax AM Peak (7-9.30am) FY 2023-24 2100 Average pax PM Peak (3-7pm) FY 2023-24 1050[11]	$20M-$30M *($12Million AUD approximate. Only)*

Benchmarks that are not deemed appropriate

Not appropriate benchmarks	Features of note	Passenger Capacity	Est. Construction Cost. (Current NZD Equivalent)
Puhinui 	Not appropriate scale too large and has grade separated bus interchange future proofed.	Average daily boarding count 2023-2024 981[12]	$70M-$90M

[11] **Melbourne metropolitan train station patronage data sourced from:** https://discover.data.vic.gov.au/dataset/annual-metropolitan-train-station-patronage-station-entries/resource/57faf356-36a3-4bbe-87fe-f0f05d1b8996

[12] **Auckland rail patronage data sourced from**: **https://fyi.org.nz/request/27853-rail-patronage-data-by-station**

Sydney Light rail (MVP) 	Not ambitious enough and does not have sufficient civic qualities for Waterloo Station. Doesn't factor in a placemaking element which is required for Waterloo. Utilitarian, and responsive to environmental climate.	$5M-$7M (Minor platform level developments)

Notes regarding benchmarks referenced

Note regarding costs referenced:

- These budgets are for the construction costs only if we were to construct the example stations at Waterloo currently.
- No allowance for demolition of the existing structure.
- We could assume that the estimated costs included for construction contingency.
- The estimated costs do not allow for any associated rail related upgrade work, including new lines, overhead electrification, modification of existing lines.
- The estimated costs do not allow for any associated roading or carpark upgrade works, including the roading to enable a bus interchange.
- The estimated costs do not allow for any upgrade of existing services infrastructure, including three waters, or incoming electrical supply.
- The estimated costs do not allow for the staging or construction around the existing constraints such as the aquifer, the live rail, and the water treatment plant.
- No allowance for professional fees, consent costs, development levies (may not apply).
- No allowance for future escalation, however it would be prudent to assume 3%-4% per annum for the next two years.

Note regarding passenger numbers referenced:

- Passenger numbers are approximate, based on available information if able to source.

APPENDIX C
OPPORTUNITIES AND CONSTRAINTS

7.2 Appendix C
Opportunities and Constraints

7.2.1 Decoupling Waterloo Station and Bus Interchange from the TOD

A commercial investigation, of the Waterloo TOD project ran from November 2022 to November 2023 and focused on three objectives:

1. To better understand project feasibility and development approaches;
2. To evaluate commercial opportunities and considerations; and
3. To explore funding models and attracting private investment.

A key recommendation of the commercial investigation was setting the demarcation of the station and the urban development components of the TOD and the development of a reference design for the Waterloo Station. The basis of this recommendation is provided in the following.

TOD's are inherently complex as their success is partly the result of the integrated nature of their functions and services. To the typical pedestrian, passenger or tenant, the demarcation between Station and Urban Development (collectively the TOD) is generally not perceivable, nor important.

However, technical demarcation between Station and Urban Development is important for many reasons including defining:

1. Legal ownership
2. Liability
3. Operating, servicing and security responsibility
4. Revenue and cost allocation.

A detailed demarcation is needed between the Waterloo station and the urban development component of the TOD. In setting the demarcation, a general principle to be used is that "the station shall never be reliant on the urban development". This means all station components, structure, facilities, spaces, security, operational systems etc., that are required for the uninterrupted functional performance of the station asset are independent from the surround urban development. However, the urban development may rely on the station, for its function, but the components of the station relied upon should be carefully considered – for instance the use of secondary entrance ways for retail. Demarcation between the station and the urban development may be in the horizontal (defined by a floor, roof, transfer deck) or vertical plane (defined by a wall/door/window). The more integrated a TOD is, the more complex the demarcation.

A clear demarcation enables decoupling of TOD components, meaning station and urban development can be procured on their own eliminating reliance on other components for success.

Waterloo Station is most suited to Adjacent Station Development. This key recommendation, accepted for this project to deliver a reference design for the Waterloo Station, seeks the decoupling of the station design from the development of the surrounding land in the precinct and the wider local catchment (land

within 800m of the station). The decoupled adjacent station development arrangement is illustrated in Figure 3.

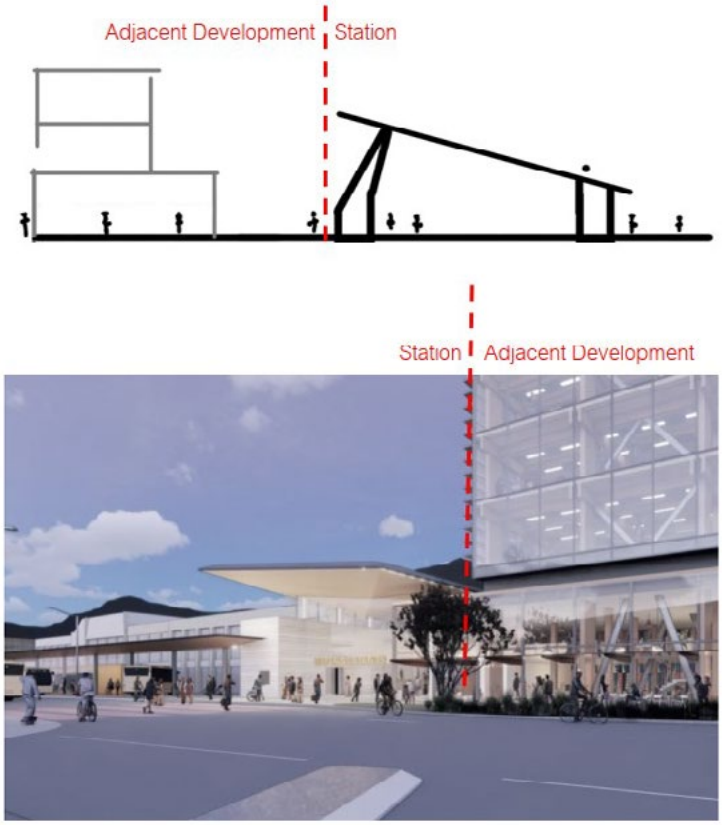


Figure 2 – An adjacent station development demarcation (source Willis Bond)

7.2.2 2. Waiwhetū Aquifer – source water risk management implications

The Waiwhetū aquifer is a key drinking water source for the Wellington region. The aquifer comes under significant stress in summer and recent technical work has highlighted that areas of the aquifer are vulnerable to surface contamination. There is also very little resilience or redundancy in the water supply infrastructure to manage the effects of a reduction in groundwater levels or a chemical contamination event in the Waiwhetū aquifer. This combination of factors means that the security of the drinking water supply is highly sensitive to change.

The Waterloo Station and TOD is in proximity to the Waterloo bore field in the Knights Road area, extracting water from the Waiwhetū aquifer. The water treatment plant is located in the Waterloo precinct of the TOD.

The risks to the Waiwhetū aquifer water supply are likely to increase. These risks can be broadly categorised as contaminant sources, activities that create/exacerbate contaminant pathways and/or water availability risks. Increasing urban intensification in the Lower Hutt Valley, increasing water demand and climate change could all place additional pressure on the aquifer.

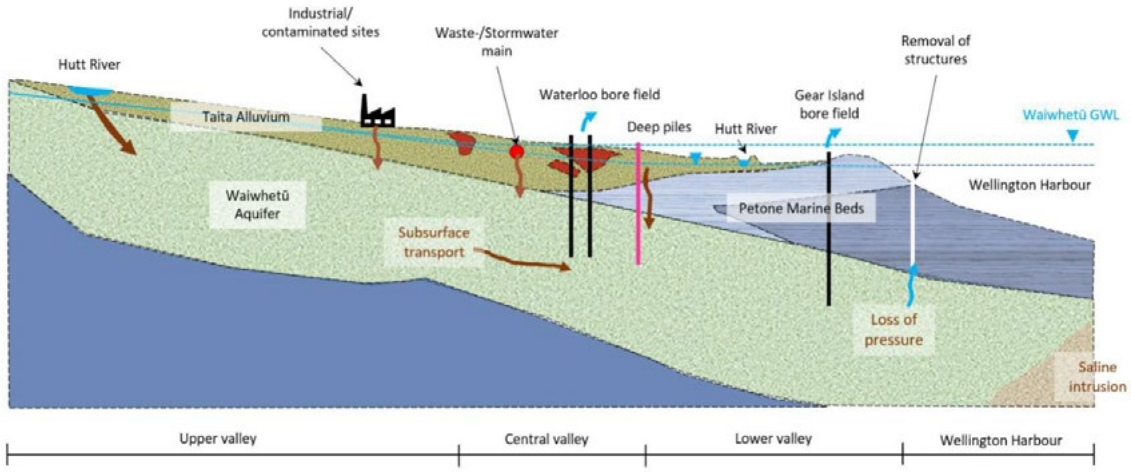


Figure 3 - Source water risk conceptual model (not to scale) (source Wellington Water)

A potential contamination source is urban development. Contaminant pathway risks may be exacerbated as Hutt City intensifies (i.e., piling for urban developments); this is of particular concern close to the Waterloo bore field in the Knights Road area. However, these activities could be managed through additional rules to control specific associated activities, such investigation drilling, excavations and wastewater infrastructure.

The Waterloo Station and TOD due its proximity to the Waterloo bore field is likely to pose a risk to the aquifer from urban development and associated piling. This risk will need to be managed with alternative foundation possibilities and management of stormwater runoff.

7.2.3 Waterloo Train Station Canopy

A condition reassessment of the canopy and roof structure has been undertaken with a focus on corrosion, expected residual life span of the canopy in years without maintenance, and the maintenance recommended. It is not clear what the length of the additional life span will be achieved with the maintenance proposed. There is also no cost estimate on the maintenance or the total replacement of the space frame and roof. (add some photos)

Roof - the current roof has an estimated lifespan of 2 to 3 years if no maintenance is carried out. Remedial work recommended in the next 12 months:

- Power wash the entire roof
- Touch up the areas of corroded sheeting around the internal gutters.
- Replace the corroded areas of internal gutters at the upper and lower levels.
- Replace the corroded hold-down screws between sheeting and purlin.
- Block all pigeon/vermin entry points.
- Power wash pigeon droppings.
- Fix the ridge overlapping and flashing details at joints/corners.
- Paint touch up required in the areas of corroded bottom roof sheeting below the ridge line.
- Purlin vertical support posts - estimate that maintenance to some of these elements will be required in the next 6 to 12 months to prevent more extensive repairs (possibly even member replacement) being required. Remedial work commended in the next 12 months: Abrasive blast and re-paint the square hollow section supports and connections in the upper and lower-level portions of the roof.
- Steel purlins - purlins are generally in good condition with only isolated cases requiring remediation in the next 18 to 24 months.
- Space frame top chords - top chords are generally in good condition but there are areas of heavier corrosion located in the Southwest corner. The bolts and nuts associated with the top chords need maintenance within the next 12 to 24 months. Remedial work commended in the next 12 months: Abrasive blast and re-paint the top chord connection bolts. Also, repaint the chord members to prevent corrosion as most paint has already flaked off
- Space frame diagonals - diagonals are generally in good condition, except for areas of heavier corrosion located in the Southwest corner. Remedial work commended in the next 12 months: Repaint the diagonal members to prevent the start of the corrosion as most of the paint has been flaked off.
- Space frame bottom chords - the bottom chords are generally in good condition but there are areas of heavier corrosion located in the Southwest corner. Remedial work commended in the next 12 months: Repaint the bottom chord members to prevent corrosion as most paint has already flaked off.

7.2.4 Land Ownership

The Waterloo Station Precinct has a total of 19,000m^2 of developable land, made up of defined parcels (see figure 2). To clarify Waterloo Station, "the station" comprises the platforms, bus stops, accessways and associated buildings and equipment. The Waterloo Station precinct "the precinct" comprises the land surrounding the station.

KiwiRail Holdings – +12,500m^2 of Crown land under KiwiRail Holdings, currently used for carparking of the eastern and north-western side of the station. Note, this area does not include the rail corridor and sub-platform land. While KiwiRail have given support in principle for their land to be included in TOD investigations, the ultimate inclusion of this land in any commercial development will be dependent on negotiations and on the terms of any Crown covenants which have yet to be determined.

Hutt City Council – 1,650 m^2 block of land adjacent to the Wellington Free Ambulance building which is currently used for a Metlink Park and Ride.

Greater Wellington Regional Council – 4,700 m^2 of land is under Greater Wellington ownership. This land, which includes the former Railways Corporation administration building, was purchased by Greater Wellington in 2017 from Land Information NZ. The land is predominantly used for Park and Ride, while the old administration building has one tenant on a short-term lease. Two Degrees lease space on the station canopy for three cellphone antennas. The Commercial investigation phase of the TOD process determined that the Great Wellington land is the most developable parcel of land in the precinct, due to its west-facing aspect, CBD adjacency and favourable land dimensions.

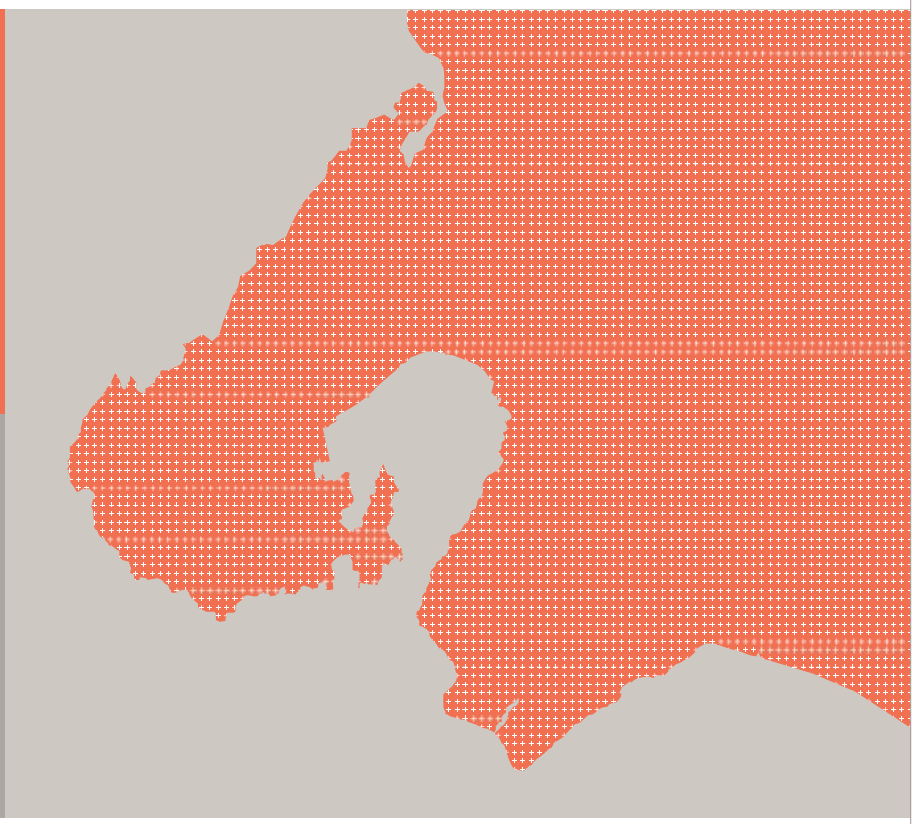
Waterloo Water Treatment Plant - A notable feature of the Waterloo precinct is the Waterloo Water Treatment Plant, built in the early 1980s, which is partially surrounded by the broader station facilities on the north, south and east. The Water Treatment Plant is a significant factor in considerations relating to the broad Waterloo project. Considerations include: plant access requirements for essential materials delivery by heavy vehicle which constrain final location and utility of the bus function of the transport hub; negating any impacts from future development on the aquafer; and the 'aesthetic' of the current plant building which will need to be considered in design approaches to the proposed transport hub.


N
Waterloo Railway Station parcels
Hutt City - recreation
Road
Wellington Free Ambulance
GWRC - public transport
KiwiRail - Railway
GWRC - Waterloo treatment plant

APPENDIX C

SITE INVESTIGATION REPORT & CONSTRAINTS

WATERLOO STATION, FEASIBILITY STUDY AND REFERENCE DESIGN
GREATER WELLINGTON REGIONAL COUNCIL



Workshop 01- Opportunities + Constraints
10/04/2025

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

OUR TEAM

Greater Wellington
Te Pane Matua Taiao

aurecon

Boffa Miskell

Dunning Thornton

GRIMSHAW

RCP

RLB Rider Levett Bucknall

Tonkin+Taylor

wsp

CONTENTS

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

TRANSPORT

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

CONTEXTUAL BACKGROUND
WHAT IS WATERLOO STATION FOR?

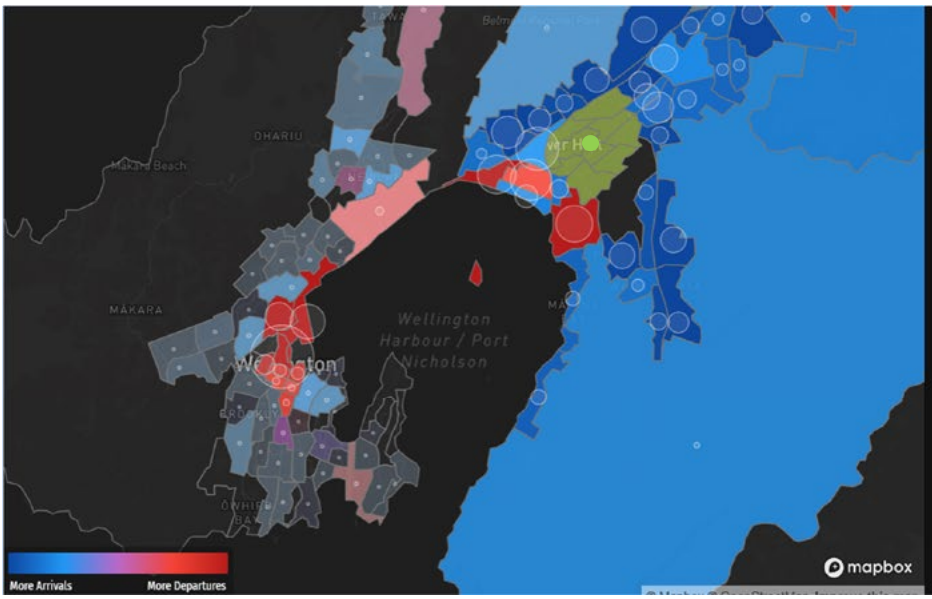
- → Region's second busiest station and a strategically significant interchange.
- → Connecting Lower Hutt to Wellington Central via express and stopping services, with several feeder bus routes.
- → Critical for access employment, education & social opportunities. Hospital and Lower Hutt CBD also attractors.
- → Growth will result in 25-40% more homes in the station catchment over the next 30 years.
- → Public transport ridership is already high, particularly for commuters to Wellington Central.
- → National Ticketing System is coming – zonal fares (bus + rail) likely to drive increased demand.
- → LIMRIM will also increase frequency and reliability, as well as quality of rolling stock.

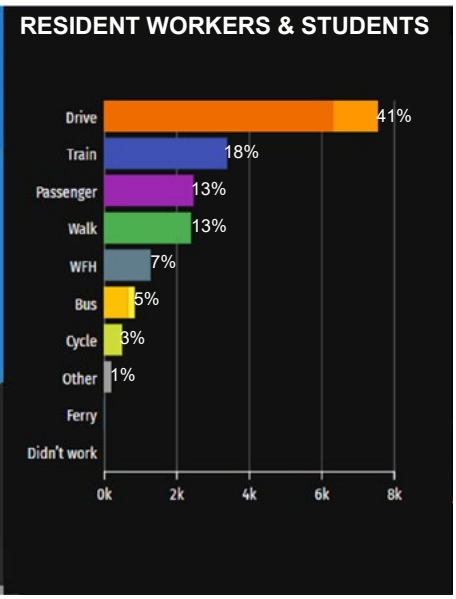
WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

COMMUTER TRAVEL PATTERNS

23% of trips starting in Lower Hutt in the morning peak are heading into Wellington City. Of these 60% are public transport.

Hutt City is expected to see a 34% increase in population between 2021 and 2054 (an additional 38,000 people).





WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

COMMUTER TRAVEL PATTERNS
HOW PEOPLE GET TO THE STATION

The majority of station users walk and typically live within 1.25km of the station. Park & Ride is the second most commonly used mode to access the station

Bus access is comparatively low, with some users travelling significant distances to access the station

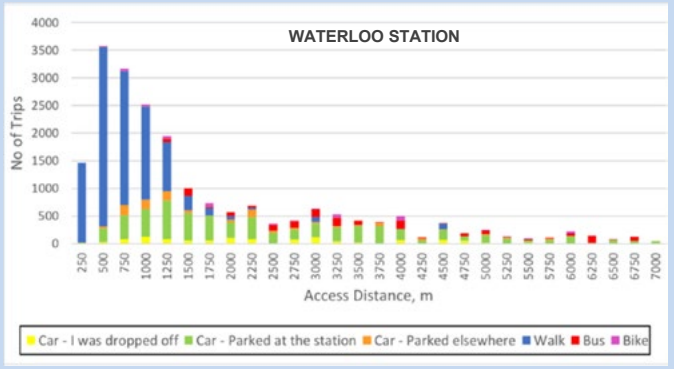


Table 5: Hutt Valley Lines, AM peak Access mode (absolute)

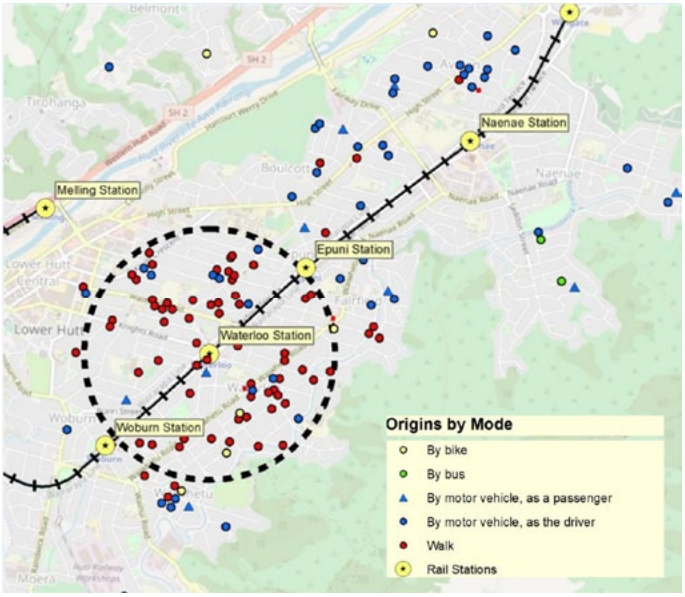
	Passenger, dropped off	P&R Car user, Parked at the station	Car user, Parked elsewhere	P&R car parks	Number of Peak hour Services	Walk	By bus	Other	Grand Total
Western Hutt	7	18	29	0	3	55	4	4	117
Melling	24	214	42	200	3	89	0	24	392
Petone	74	502	52	487	6	140	59	15	842
Ava	8	62	0	0	3	302	0	8	380
Woburn	13	214	27	160	3	328	13	7	603
Waterloo	133	667	109	601	5	800	133	97	1939
Epuni	5	22	11	0	3	92	0	0	130
Naenae	25	38	6	0	3	183	0	0	253
Wingate	0	9	0	0	3	98	0	0	107
Taita	37	179	15	61	5	74	52	7	365
Pomare	16	105	0	39	3	41	0	0	162
Manor Park	0	0	6	42	3	39	0	0	45
Silverstream	25	221	65	59	3	156	0	16	483
Heretaunga	0	43	0	0	3	149	0	0	192
Trentham	13	104	6	134	3	214	6	0	344
Wallaceville	24	105	8	126	3	177	0	0	314
Upper Hutt	104	274	9	352	3	151	0	28	567
Grand Total	509	2776	386	2261	3	3090	268	206	7235

GWRC Rail Survey Park & Ride (2017)

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

COMMUTER TRAVEL PATTERNS
WHERE PEOPLE ARE TRAVELLING FROM

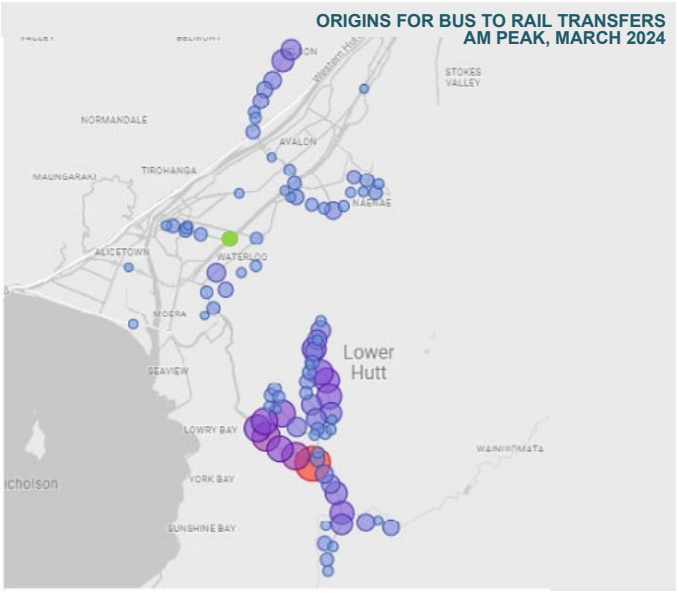
- → Walking is the primary mode of access to the station, with a reasonably even split between those who access from the east and those who access from the west.
- → Fare zone change (Waterloo Zone 4; Naenae Zone 5) & availability of car parking mean commuters are willing to drive some distance to access the station at Waterloo.
- → There are also a percentage of people driving to the station who live within a 1km radius.
- → Greater Wellington estimates approximately 300 people per day drive from Wainuiomata to Waterloo Station, and commute from there into Wellington City.
- → Cyclists make up a very low share of current station users, but travel e/w through the station.



WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

COMMUTER TRAVEL PATTERNS
WHERE BUS USERS ARE COMING FROM

- → 12% of passengers (240 people) boarding at Waterloo Station during the AM peak were transfers from a bus (March 2024), with the remainder accessing by other modes
- → The single leading origin for bus-to-rail transfers was Wainuiomata, with 62% of transfers
- → During March 2024, between 6am to 9.30am, approximately 150 people per weekday caught a bus from Wainuiomata and transferred to a rail service at Waterloo station (within 30 minutes of alighting) to head to Wellington CBD.
- → 77 of bus-to-rail transfers made at Waterloo Station came from bus routes 160 and 170 (Wainuiomata North and South)
- → Other notable origins include Naenae & Kelson

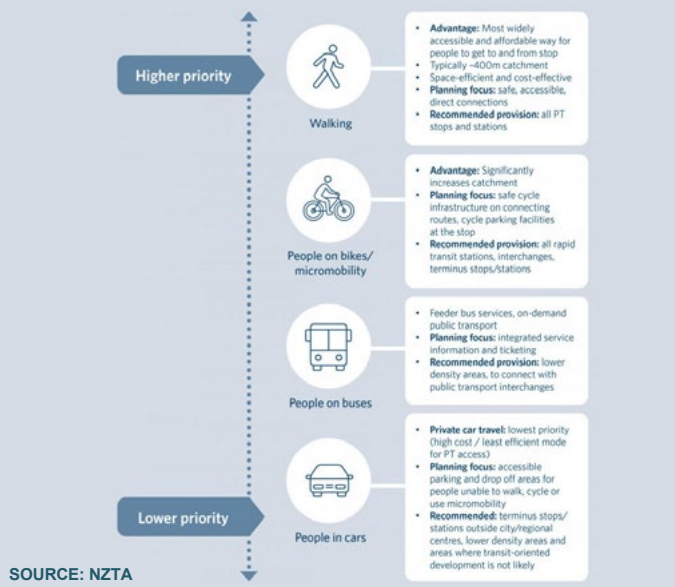


WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

ONE NETWORK FRAMEWORK
FORM AND FUNCTION OF THE STREET NETWORK

- → Streets surrounding the station are classified as Activity Streets, Urban Connectors and Local Streets
- → Activity Streets have a higher place value, and high foot traffic with active street frontages. Often features amenities like seating, trees, lighting, public art
- → Lower traffic volumes and speeds to enhance safety and comfort for people walking and cycling
- → Typically, Activity Streets prioritise access over through-movement, especially for pedestrians and local vehicles
- → Current LOS gap between function of the streets and the current form, which do not meet the requirements of an Activity Street

STATION ACCESS HIERARCHY
FRAMEWORK FOR PLANNING STATION ACCESS



SOURCE: NZTA

WALKING ACCESS
CONSTRAINTS & OPPORTUNITIES

Constraints: Issues with access, street clutter, permeability and safety resulting in a low level of service for people accessing the station by foot.

Low quality crossings on eastern side of station, impermeable sections of road at street level due to high vehicle speeds and barriers to crossing.

Subway only access via western side of station. Critical E/W link for people travelling through the area (and not taking the train). Poor wayfinding and visual queues to the station.

Opportunities: Station location, street layout and topography mean that Waterloo Station is highly accessible by foot.

Housing density changes will substantially increase the number of people living within the walking catchment zone

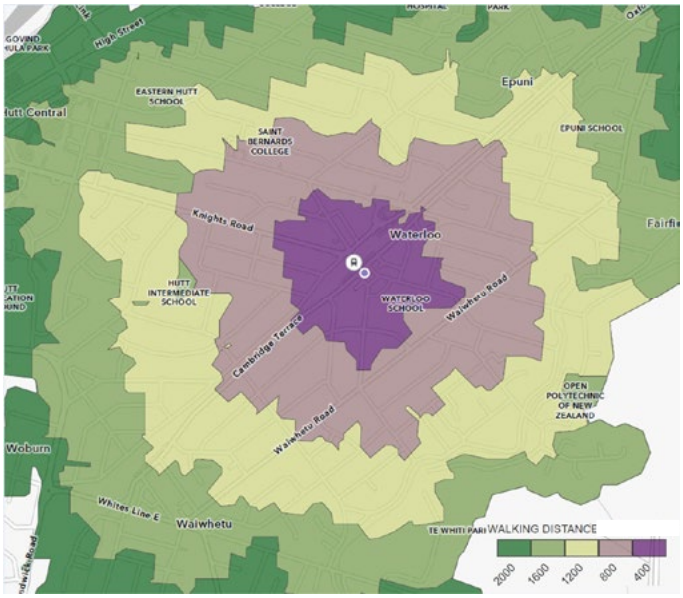
Evidence shows that catchment sizes increase in areas that are particularly pedestrian-friendly as people are willing to walk further where it is pleasant to do so, and when the environment at the station is also pleasant.

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

WALKING ACCESS
CATCHMENT MAPPING

Walking catchment	For
≤400m or 5min walk	Low frequency public transport stops
≤800m or 10min walk	High frequency public transport stops (a service at least every 15min)
800m – 1200m or 15min walk	High frequency and rapid public transport stops or stations

Walking | NZ Transport Agency Waka Kotahi



WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

CYCLING / MICROMOBILITY ACCESS
CONSTRAINTS & OPPORTUNITIES

Constraints: No on-road or off-road dedicated cycle paths / lanes to the station (Beltway nearby but stops short of station).

Extremely low demand – 9 cycle parking spaces were occupied on the day of the site visit (AM peak).

8 parking spaces within the station on the eastern side (poor quality), 20 stacked spaces on the western side (good quality).

Poor perceptions of safety and security of bikes parked at station with low passive surveillance outside of peak; no staffing; & current parking design on eastern side not secure.

Opportunities: Like walking, a range of factors support a growth in cycle demand to access Waterloo Station, including a network of quiet neighbourhood streets.

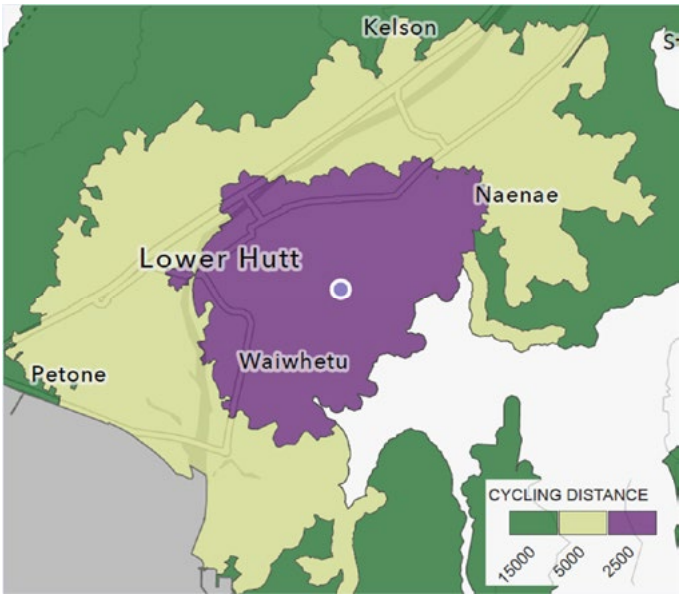
Station catchment increases substantially with cycling, particularly with the ever-increasing uptake of e-bikes.

High quality, secure and well positioned cycle parking will support increased uptake, along with on-street infrastructure changes to support safe & direct access.

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

CYCLING ACCESS
CATCHMENT MAPPING

Riding catchment	For
≤2.5km or 10min riding	All public transport stops or stations with convenient end-of-trip access to stop/station, amenities and attractive public transport services
≤5km or 20min riding	Premium public transport stops and high passenger volume stations with high-quality, secure end-of-trip facilities
Up to 15km	Limited uptake, only for high passenger volume public transport stations where there is a long-distance commute to the nearest activity centre; important for 'end of line' services, particularly train stations, and some e-bike access

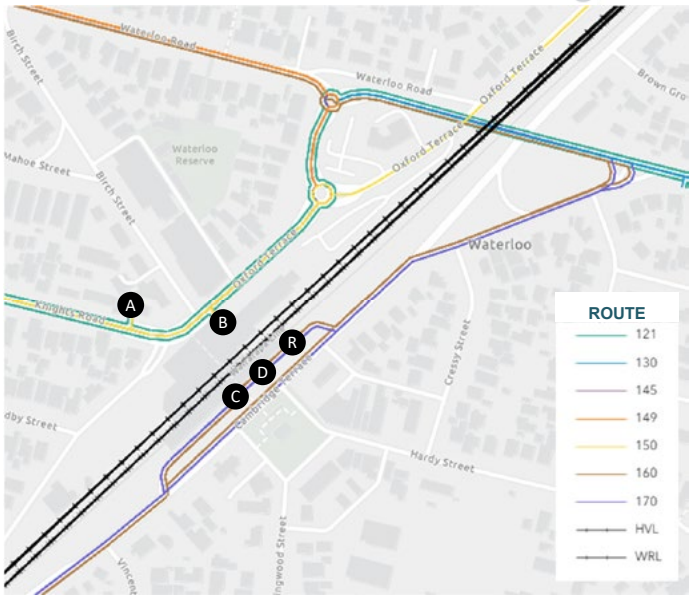


WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

BUS ACCESS
EXISTING NETWORK AND FACILITIES

- → Four bus stops serve the station. Stops A/B (west), stops C/D (east). There is an additional rail bus service stop (double stop), northeast of stop D.
- → During the highest demand hour (PM peak) 36 buses collectively operate via stops A-D.
- → Of these, 75% travel east–west across the Waterloo Road bridge.
- → The remaining 25% operate exclusively on the western side of Waterloo Station.

Bus Stop	Stop Type	North bound	South bound	Total
A	Single (~15m)	5	2	7
B	Double (~32m)	4	8	12
C	Single (~20m)	10	-	10
D	Single (~20m)	-	7	7
(R) Rail Replacement	Double (~40m)	-	-	-



WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

BUS ACCESS
CONSTRAINTS & OPPORTUNITIES

Constraints: No direct east-west / road-over-rail connection (Waterloo Road 500m north of station is closest connection). The internal station circulation also leads to inefficient bus operations (east of the station).

Similar bus volumes west / east of station – there is no clear dominant side for co-location of stops without negatively impacting a large % of users (in the absence of direct road-over-rail connection).

Quality of the bus stops on the western side of the station is very poor.

The location of taxi bays affect entry / exit tapers of bus stops; limits stop capacity and negatively impacts bus operations

Opportunities: Potential to consolidate current separate bus stops into a single, high-quality location. Measures to improve internal station circulation to improve bus circulation (east of station).

Optimisation of the location, and allocated space of stops C, D and R to better reflect their frequency of use. Consideration of provision for demand responsive bus (DRB) services; as well as Bus Replacing Trains (BRT) services, given ongoing Kiwirail capital programme.

High potential to minimise transfer time to connecting rail services, from boarding point to boarding point, with bus facilities to be positioned as close to platforms on as possible.

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

PICK UP DROP OFF (PUDO) ACCESS
CONSTRAINTS & OPPORTUNITIES

Constraints: No current formal facility, PUDO occurring informally in various locations around station (observed a bus stop being used).

Logical area for PUDO are currently being used for all day commuter parking. Locations of existing taxi bays negatively impacting other modes.

→ Two taxi bays on western side of the station restrict operations & capacity of Bus Stop B.

→ Taxi bays (east) restrict bus movements into Bus Stop C, requiring additional space. Bay positioning may also cause conflict with northern mobility parking bays when exiting the station.

Opportunities: Repurpose the existing commuter parking adjacent to the station as a dedicated PUDO and taxi bay area.

A dedicated PUDO area will remove the need to use alternative areas (i.e. bus stops).

Reallocating the taxi bays will allow for increased bus stop capacity.

Three taxi bays impacting both bus and mobility parking operations. Similar problem on Oxford Terrace (western entrance)

All day parking located where PUDO / taxi bays would typically be located

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

PARK & RIDE ACCESS
CONSTRAINTS & OPPORTUNITIES

Constraints: Survey evidence confirms there are inefficiencies in the current use of Park & Ride at Waterloo, meaning it may not be delivering the full benefits for those who need it most.

Of particular note is the proportion of P&R users originating from locations that are well served by existing bus feeder routes

In some cases, people are driving to the station from within the walking and cycling catchment zones.

Early arrival times and high utilisation mean users from the wider catchment may be prevented from using the station. Future growth and demand will exacerbate the issue.

There is also overflow onto surrounding streets, resulting in amenity and accessibility impacts

Opportunities: Rationalising car parking spaces and introducing demand management mechanisms will support behaviour change to more efficient modes, when coupled with measures to improve multimodal access to the station and ease of interchange to rail.

This will enable a more efficient use of the space available, improved amenity within the station precinct and will enable development in the station precinct.

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

SUMMARY OF INVESTIGATIONS
CONSTRAINTS & OPPORTUNITIES

- → Waterloo Station's access hierarchy prioritises private car access over other modes, with walking and cycle access having the lowest priority
- → However, bus network inefficiencies and poor facilities, coupled with an unsuitable form of the local street network for active modes means that station users lack attractive alternatives to the car
- → To realise growth within the PDA, and to unlock the full benefits of the LINRIM capacity uplift and other planned investments, Waterloo Station needs to be an exceptional interchange facility – both for the local community and the wider catchment (eg Wainui)
- → Bus, walking and cycling are the most efficient means to access the station, in terms of both cost and space. The opportunity lies in ensuring the form and function of the station building and wider precinct aligns with the modal access hierarchy, and bus services are optimised to support increased patronage on feeder routes
- → This will deliver an attractive multimodal interchange, providing increased travel choice and improving people's access to employment, education and social opportunities
- → Opportunities will not be realised unless the inefficiencies of the current P&R facility are resolved, including rationalising the number of spaces and introducing demand management mechanisms

CIVILS

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

WATER ASSETS
CONSTRAINTS AND OPPORTUNITIES

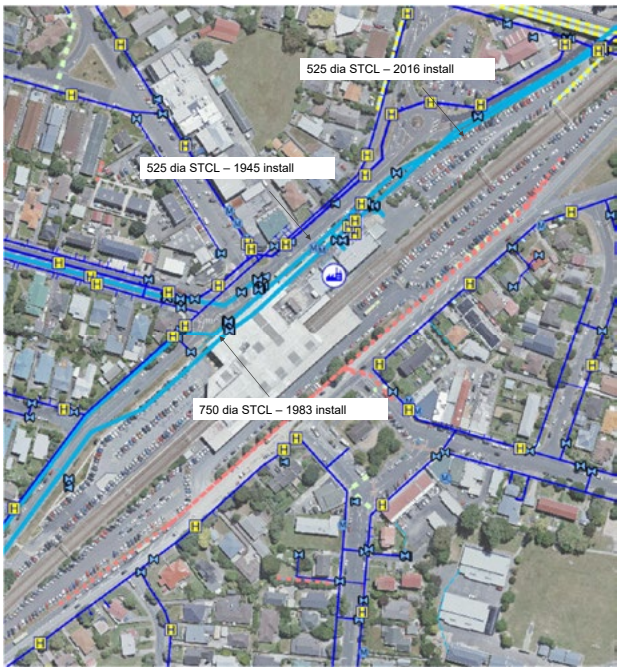
The Challenge:

→ Waterloo Water Treatment Plant proximity and associated pipe work (large diameter and aged in parts).

→ Some aged reticulation network that is not likely sized for the proposed density uplift in the area.

The Opportunity:

→ Flexibility with reticulation connection options across the area.



WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

WASTEWATER ASSETS
CONSTRAINTS AND OPPORTUNITIES

The Challenge:

→ Proximity of the large trunk main to the southeast of the train station – 900dia concrete ~ 1.3m to top of pipe. This is a critical HCC asset that needs to be avoided.

→ Aged reticulation network to the southeast which likely is not sized for the proposed density uplift of the area.

The Opportunity:

→ Reticulation connection options to the northwest.

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

STORMWATER ASSETS
CONSTRAINTS AND OPPORTUNITIES

The Challenge:

→ End of life stormwater assets surrounding the site (1940's – 1950's – concrete pipe).

→ Reticulation network not likely sized for the 2025 + requirements

The Opportunity:

→ Reticulation connection options to the northwest and southwest.

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

FLOOD EXTENTS
FURTHER CONSIDERATIONS

The Challenge:

→ The Interchange largely sits above the 100 year flood levels. However, the GWRC Flood Hazard Area Maps shows some flooding to the NW edge of the WWL compound in a 440 year event (ie River stopbank breached).

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

STORMWATER
FURTHER CONSIDERATIONS

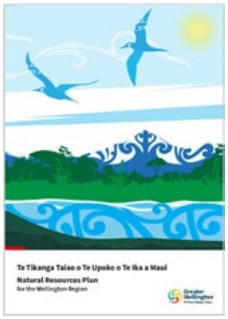
The Challenge:

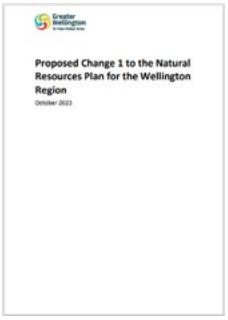
→ Re-development will trigger requirements for hydraulic neutrality and water sensitive design. These elements have spatial consideration, such as raingardens (to ensure 90% treatment of dissolved metals) and 1% AEP attenuation.

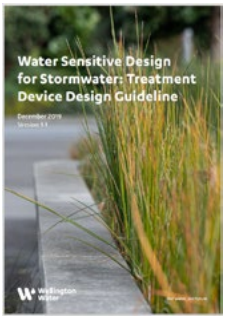
The Opportunity:

→ Opportunity to provide an inviting green space achieving hydraulic neutrality and demonstrate best practice.

→ Water re-use opportunities.







WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

OTHER UTILITIES
CONSTRAINTS AND OPPORTUNITIES

The Challenge:

→ Shallow Chorus duct bank (6 x 100dia ducts) immediately south of the structure.

→ LINZ survey structures within station and surrounds which will need to be protected.

The Opportunity:

→ Good connection options to comms and electrical, including:

- → 2 Degrees
- → Eon Fibre
- → Chorus
- → Wellington Electricity

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

BUILDING SERVICES

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

ELECTRICAL INFRASTRUCTURE
SITE BACKGROUND

- → Waterloo Station is serviced by a 500kVA transformer situated in the Waterloo Zone substation on Knights Road.
- → The stations current supply is 100A, 3phase.
- → The transformer currently has an approximate spare capacity of 100A, 3phase however WE* has indicated they would need to further investigation to confirm.
- → The current main incoming cable is 300mm AL (400A capacity in underground duct).
- → Initial advice from Wellington Electricity (WE*) indicates if we are to double the demand (over 200A is required) they would suggest a new substation being installed.

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

ELECTRICAL & ICT
CONSTRAINTS AND OPPORTUNITIES

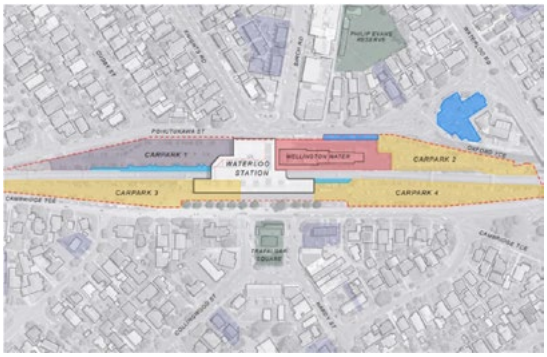
The Challenge:

- → Limited spare electrical capacity for expansion or development.
- → People feel unsafe, security infrastructure can be improved.

The Opportunity:

- → Solar PV panels can be introduced for green energy supply.
- → Adding a new substation will unlock future commercial developments of the area.
  - → We could also accommodate lifts in lieu of inefficient ramps
- → Free WIFI could be incorporated to entice people to use the facilities within the station.
- → Upgraded security will help passengers feel safer.
- → New site lighting will reduce unwanted behaviours and improve the station ambience.
- → Install PA system, EV chargers

Location of Site Transformer



Waterloo station and transport-oriented development area

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

MECHANICAL SERVICES
CONSTRAINTS AND OPPORTUNITIES

The Challenge:

→ Positioning of external plant needs to consider proximity to passengers, loading areas and Wellington Water facilities.

→ Mechanical services should enhance rather than distract from the customer experience.

The Opportunity:

→ Mechanical systems can be used to increase occupant comfort and staff satisfaction.

→ All Building Services to be designed with safety and maintainability in mind.

Building Services exterior plant must consider proximity to passenger and loading areas

Enclosed Spaces should include provision of NZBC-compliant air conditioning and consider requirements for heating and cooling

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

HYDRAULICS AND FIRE PROTECTION
CONSTRAINTS AND OPPORTUNITIES

The Challenge:

→ Minimal challenges present for these services.

The Opportunity:

→ Improve bathroom facilities within the station.

→ Fire Protection solution can be tailored to balance client requirements for life safety and property protection.

Existing toilet block with adjacent roof down pipes

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

SUSTAINIBILITY
CONSTRAINTS AND OPPORTUNITIES

The Challenge:

→ Budget constraints will require targeted sustainability strategies to ensure best value for the station.

The Opportunity:

→ We can celebrate the station as a new community hub aiming to encourage sustainable behaviours in the public.

→ Sustainable design can be focussed on public usability, practicality and climate resilience for station longevity.

→ Opportunity to reduce carbon emissions through design as well as operations.

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

URBAN DESIGN + LANDSCAPE

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

AGENDA / URBAN DESIGN

1. Urban Development Backstory
2. Landscape / Identity / Culture
3. Urban Development Today
4. Observations
5. Connectivity

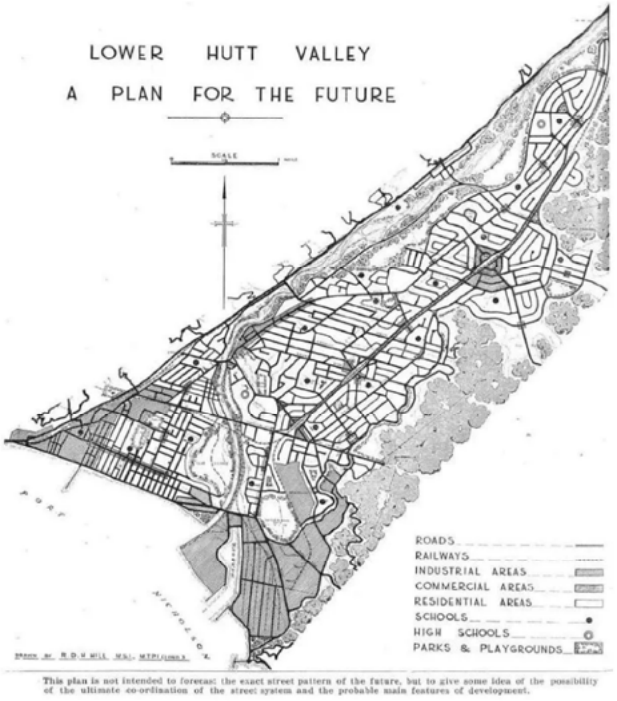
WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

URBAN DEVELOPMENT

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

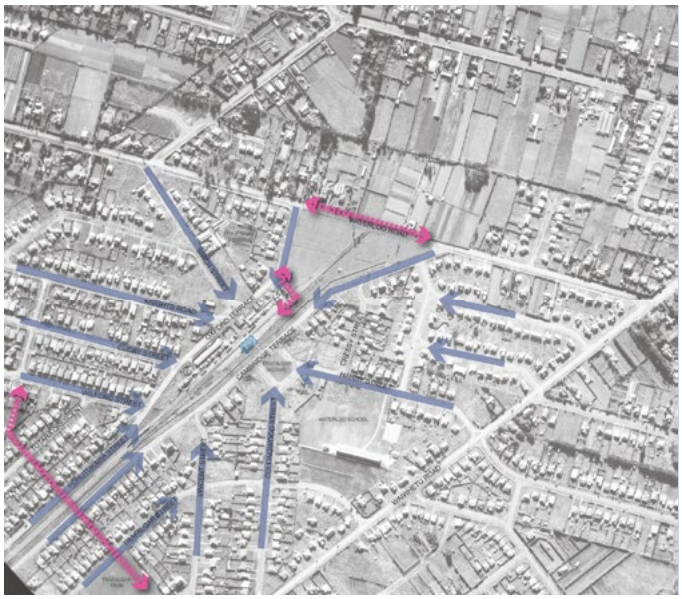
URBAN DEVELOPMENT - BACKSTORY

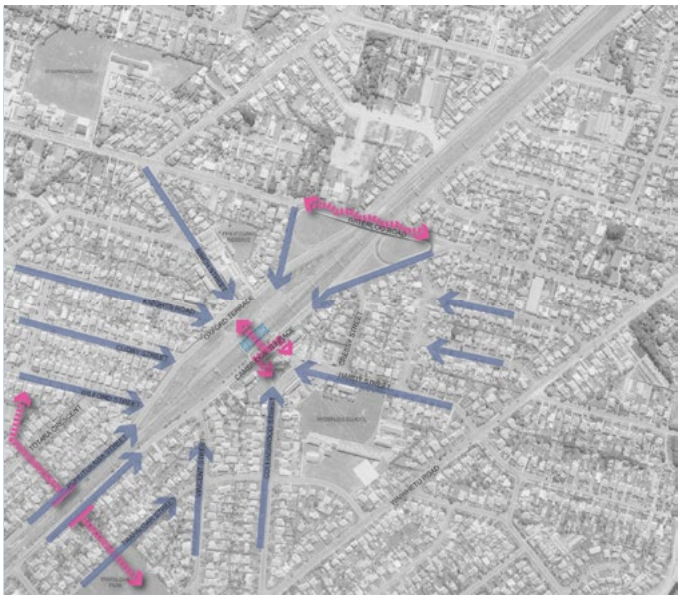
- → 1920's – Town plan
- → Land value uplift to fund infrastructure
- → Garden City - 'Model workers settlement'
- → Supported by community infrastructure
- → Land purchase, then line and Waterloo Station built – some land sold for housing
- → Formal/orthogonal street layout - centres on transport routes - streets funnel to station



WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

URBAN DEVELOPMENT
AERIALS 1939 + 1957





WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

URBAN DEVELOPMENT
SO WHAT?

Constraints
- → Road network funnels movement to rail corridor land
- → Rail + road corridors suburb severance - visually and physically
- → Private vehicle use prevalent today - more use of land/street network
- → Expectations of street apportionment - more movement than ‘place’ based

Opportunities
- → Public economic (and social) benefits from land value uplift – by whom?
- → Address severance - public safe, accessible connections across rail [and roads] + increase visual permeability across station/rail
- → Reapportion public realm in station 'precinct' to rebalance priority
- → Station as a 'place' that supports community interaction and knits back to built edges

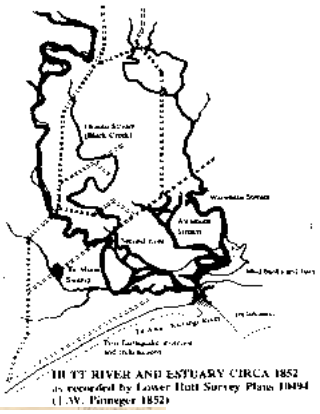
WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

LANDSCAPE / CULTURE / IDENTITY

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

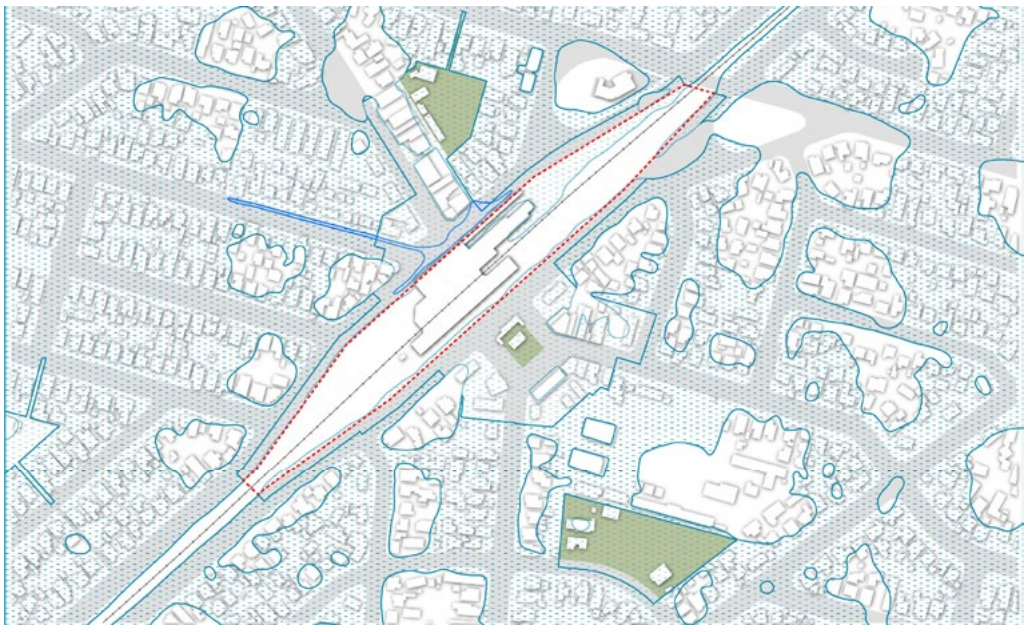
LANDSCAPE / IDENTITY / CULTURE
WATER

- → Te Awa Kairangi and Waiwhetu significant values for mana whenua
- → River plain - braided river/islands, flowing water in large swamp podocarp forest - kahikatea, pukatea, mamaku with tawa and mahoe, and supplejack and kiekie vine
- → Flood risks and urbanisation - bridges + stop banks todays landscape



WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

LANDSCAPE / IDENTITY / CULTURE
WATER



WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

LANDSCAPE / IDENTITY / CULTURE
ASPECT AND GREEN IDENITY

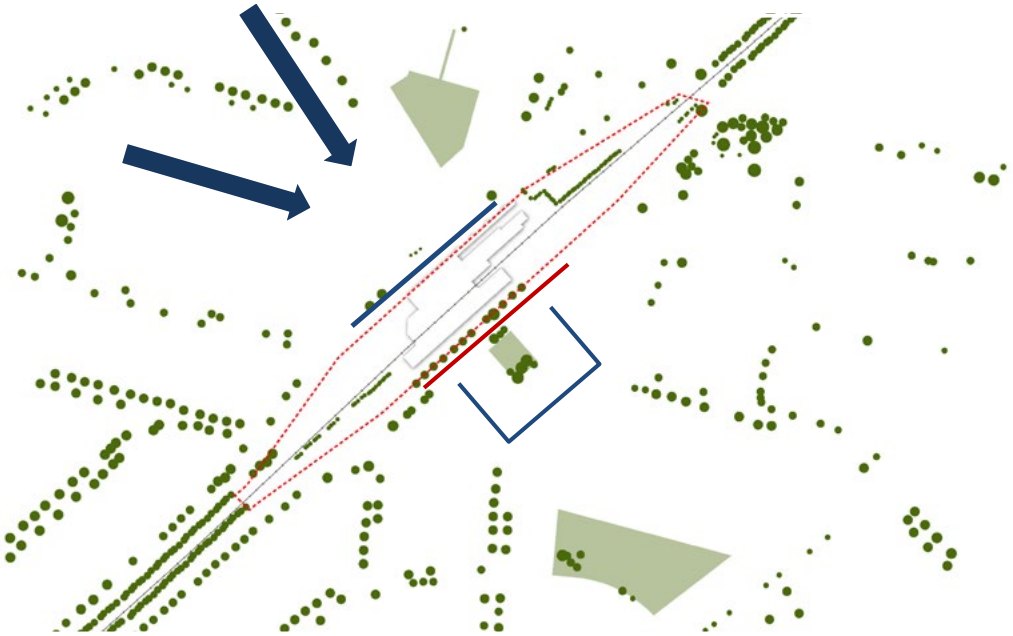
- → Garden city - model worker settlement, but also horticulture - growing
- → Formal park spaces and centre space - Trafalgar square – Station is more at-grade on Cambridge (with drive-up) than Oxford - more abrupt edge
- → Clearer “centre” identity on east side - Plunket rooms, trees, play, space formed by built edges
- → Hills (regional parks) and aspect orientation - views from within station - place

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

LANDSCAPE / IDENTITY / CULTURE
ASPECT AND GREEN IDENTITY

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

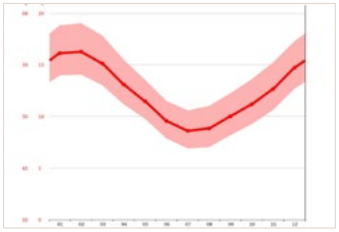
LANDSCAPE / IDENTITY / CULTURE
ASPECT AND GREEN IDENTITY

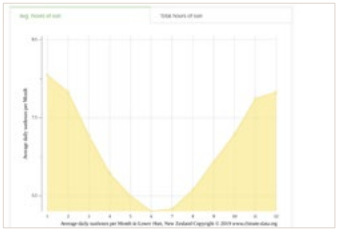


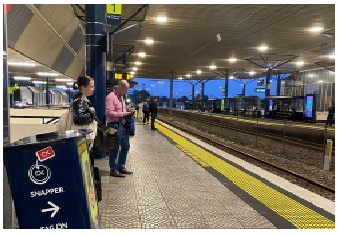
WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

LANDSCAPE / IDENTITY / CULTURE
CLIMATE AND LIGHT

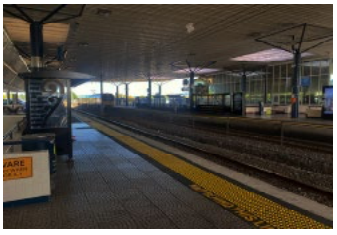
- → Hills (regional parks) and aspect orientation - views from within station - place
- → Climatic influences - ranges - low sunshine hours winter
- → Station orientation north/east south/west - morning sun east side - evening on west side
- → Canopy over prevents sunlight access although height aids light penetration - large light wells to underpass (lighter in the dark than day time)







Night



Day

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

LANDSCAPE / IDENTITY / CULTURE
SO WHAT?

Constraints
- → Involvement of mana whenua needed
- → Low amenity hard space - roads/car parks
- → Roads ownership of HCCouncil – important to improving connectivity
- → Comfort for waiting passengers in different climatic conditions - wind, rain cold light and dark

Opportunities
- → Address 2 dimensional space – verical scale needed- clear stemmed native and existing trees, vines in structure.
- → Pattern of braided water forms, wsd, concepts of bridging and increasing routes through and across space - maybe part of managing movements/access security
- → Inserting sunlit green threads further into station and immediately adjacent – connector to Trafalgar Square
- → Engage with HCC - roads to streets
- → Enhance views through station to connect across centre and enable aspect to hills to orientate to place
- → Sun access penetration to waiting spaces - choice of spaces to suit
- → Inserting ‘green’ islands into station and immediately adjacent - connector to Trafalgar Sq

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

URBAN DEVELOPMENT TODAY

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

URBAN DEVELOPMENT TODAY
LAND OWNERSHIP

- → Suburban Mixed Use Centre zone largely Waterloo Station related ownerships - only some is Greater Wellington
- → Extensive surface car parking - doesn't move all day - adds to island effect
- → 22metres – 5-ish storeys

Suburban Centre Mixed Use Zone

Ownerships within Suburban Centre Mixed Use Zone

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

URBAN DEVELOPMENT TODAY
INTENSIFICATION

- → Densification - regional strategies for growth – going up
- → Kāinga Ora housing development - no concurrent investmen and education

Kāinga Ora Development at Epuni (station to the north) indicating future development for underdeveloped Kāinga Ora sites

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

URBAN DEVELOPMENT TODAY
INTENSIFICATION

→ Densification in Area

7 homes became 73
20 car parks became 7

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

URBAN DEVELOPMENT TODAY
SO WHAT?

Constraints

→ Increased population locally [with increased support needs?] In existing areas without increased amenity/access to amenity - increased risks negative social/community outcomes
→ Ownerships of land not all GWRC - risks of decisions by others?
→ Surface car parking isolates station - makes no contribution to business activity
→ Market response/interest in investment in current physical/economic climate

Opportunities

→ Increase amenity at station - a new 'public space' - to 'spend time' and move from and across
→ Capture more public economic (and social) benefits from land value uplift in the area?
→ Gain control of more land to enable control and value uplift utilisation?
→ Push parking away from station and enable higher quality amenity spaces adjacent to station - surface connector/bridge to local streets
→ Improve amenity and bake in adjacencies and opportunity for market uplift to follow - but station still feels 'complete' without it.

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

OBSERVATIONS

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

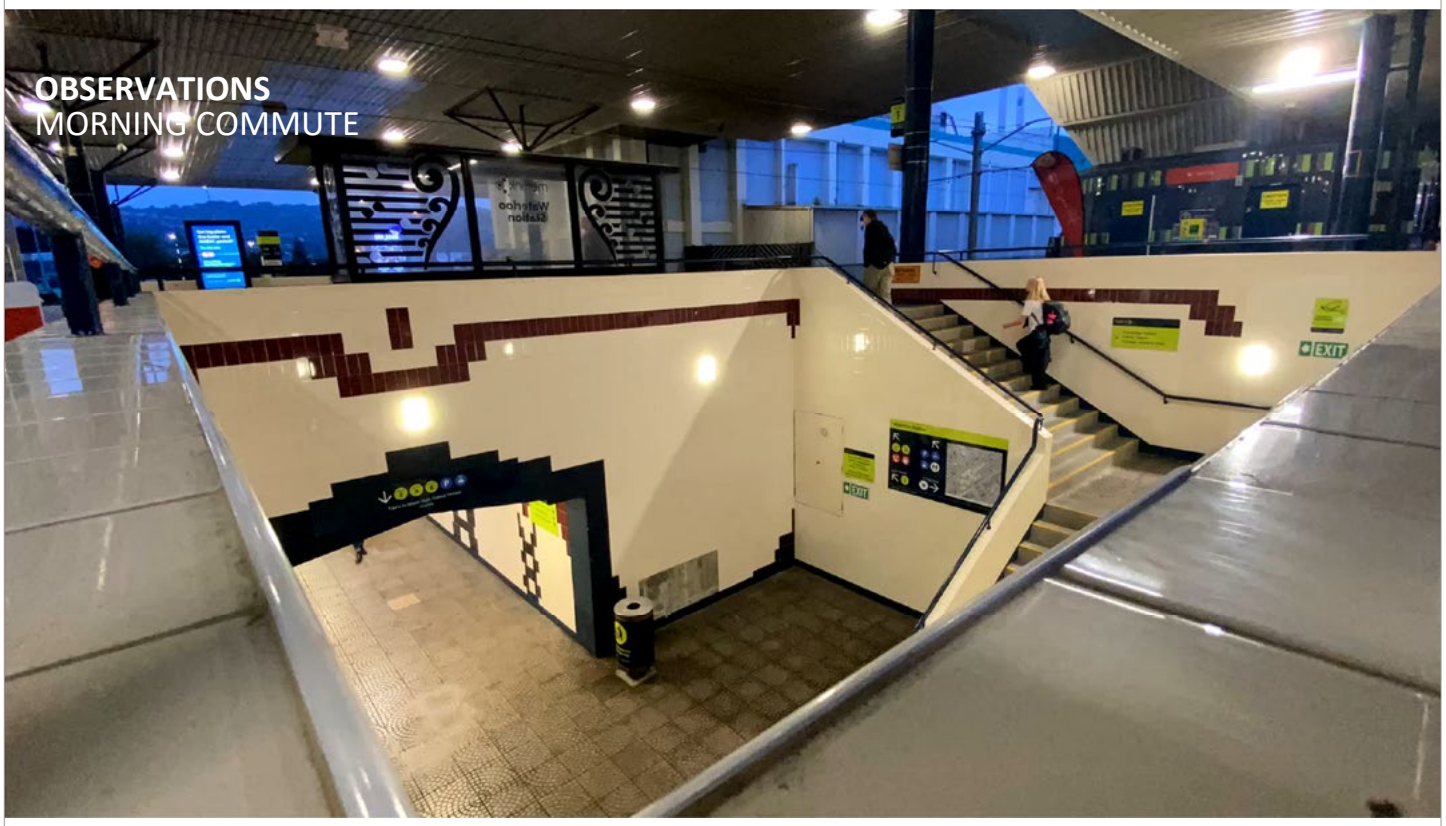
OBSERVATIONS
MORNING COMMUTE

Eastern Entrance - 7.04am - 7.09am

Western Entrance - 7.15am - 7.20am

Oxford St - 7.53am - 7.58am & Trafalgar Sq - 8.00am - 8.05am

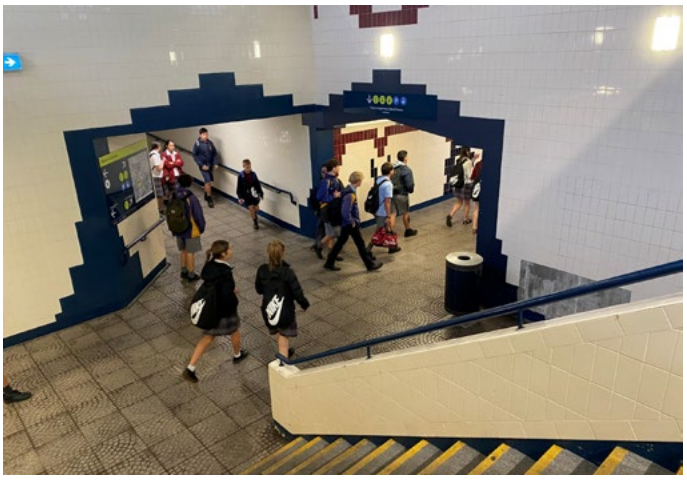
All movement



OBSERVATIONS
MORNING COMMUTE

OBSERVATIONS
WHO & HOW USING STATION?

- → Prior to 8am passengers predominantly working adults
- → Between 8-8.15am a surge in teenagers arriving / passing through
- → Most going through the station underpass were primary aged-children.
- → Train frequency enough that passengers trickle in, there is not a major influx before a train.
- → While most underpass users used the staircases, a large number used the ramps.
- → Bus loads arriving to the station were small.
- → Passengers alighting from Bus Stop C were able to transfer immediately to a train (running)
- → 3 cyclists. Each parked their bike on arrival side
- → Observed 3 people get a coffee from the coffee shop.
- → Urgency of passengers arriving at the same time as a train split. Half run for a train, and about half walk and wait for the next one.



WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

OBSERVATIONS
EVENING COMMUTE

Eastern Entrance – 5.00pm – 5.15pm

Western Entrance – 5.00pm-5.15pm

Oxford St & Trafalgar Sq – 5.15-5.30pm

All movement

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

OBSERVATIONS
WHO & HOW USING STATION?

- → Compared to the mornings, the station is much emptier as train arrives and empties at once.
- → Mostly similar patterns in terms of final destination split (repeating patterns of the morning).
- → Trains far less frequent and smaller numbers coming off train as expected with commuting patterns
- → School and high school children missing from evening rush
- → Underpass mostly empty and feels more isolated than morning as users arriving on trains at once.

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

OBSERVATIONS
SO WHAT?

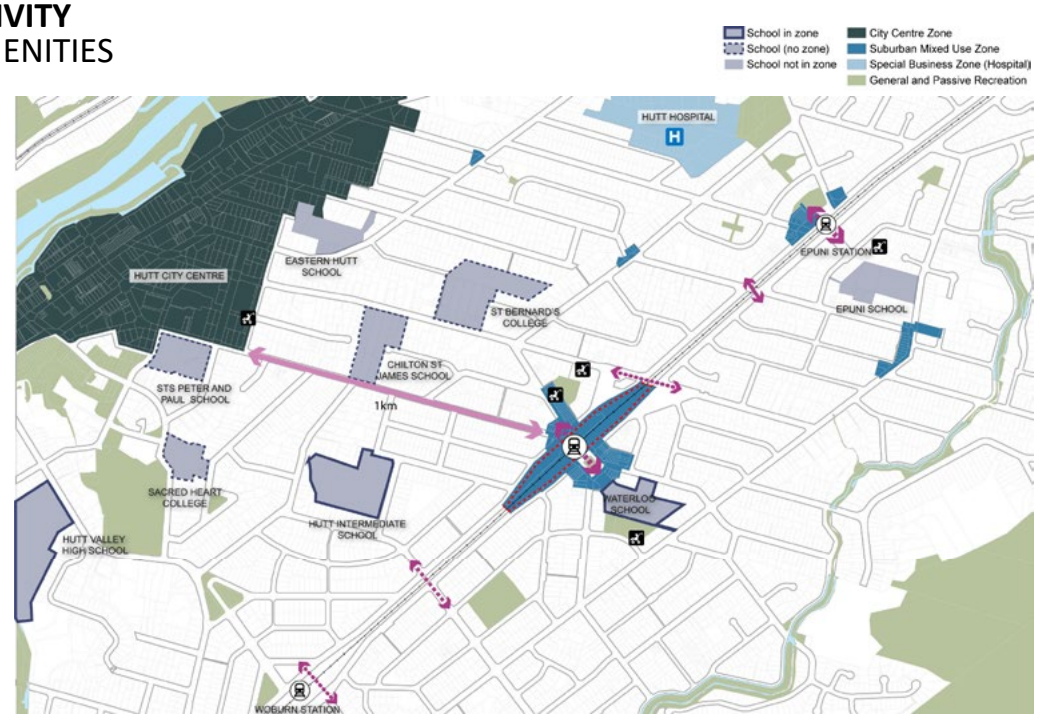
- → Morning higher intensity of utilisation - ‘pulsing’ /waves
- → Frequent through movements to connect to other side - not using train service
- → Demographic variation – adults, early and school later - group interactivity between the latter
- → Very little bus/train interchange currently
- → Some spots more popular to wait than others - at convergence points - otherwise scattered

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

CONNECTIVITY

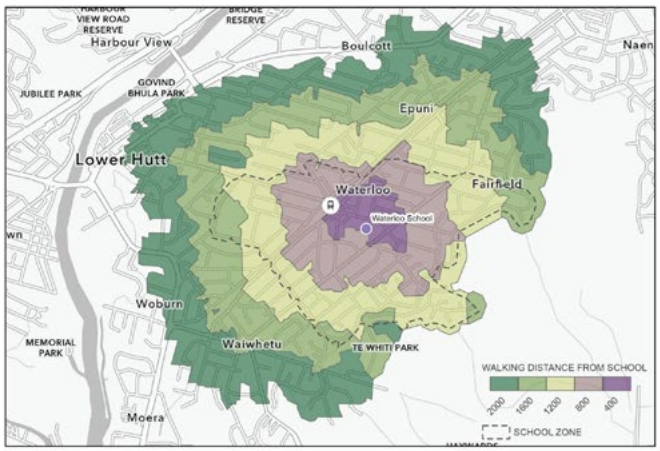
WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

CONNECTIVITY
LOCAL AMENITIES

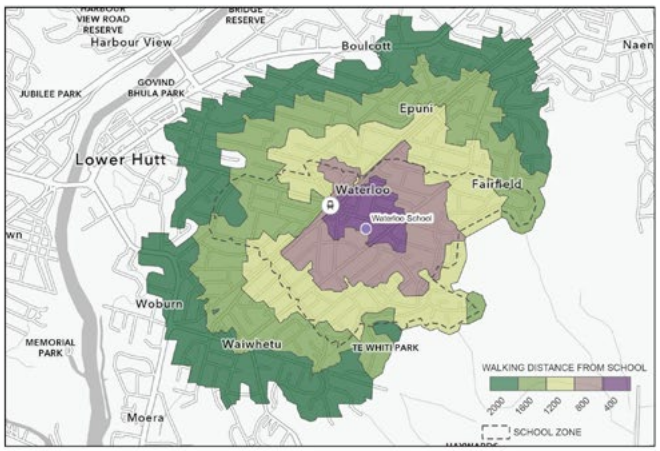


WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

CONNECTIVITY
SCHOOL CATCHMENT STUDY



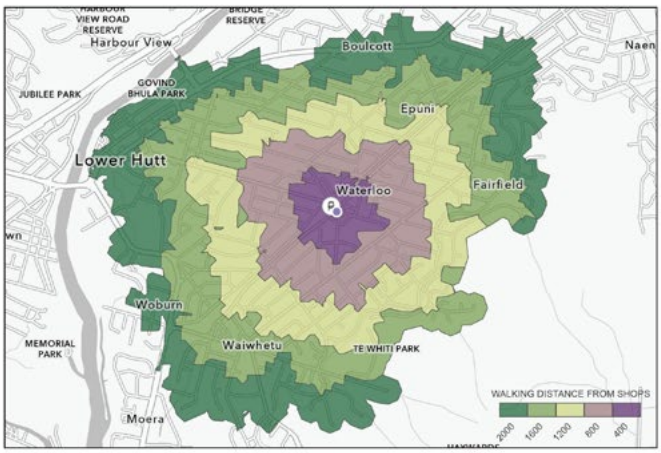
WITH ACCESS THROUGH WATERLOO STATION



WITHOUT ACCESS THROUGH WATERLOO STATION

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

CONNECTIVITY
WATERLOO SHOPS CATCHMENT STUDY



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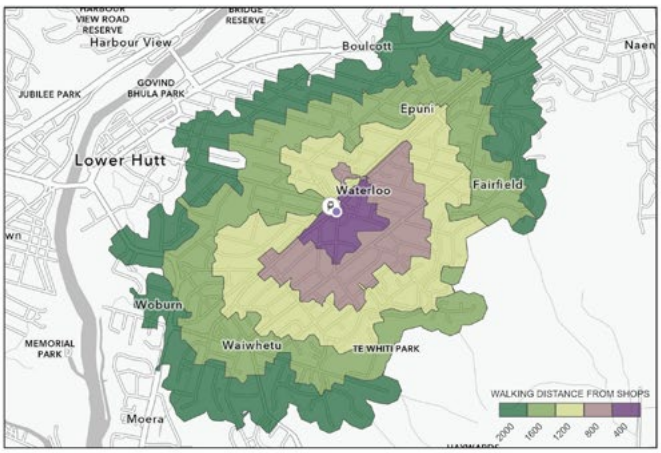

WITHOUT ACCESS THROUGH WATERLOO STATION

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

CONNECTIVITY
PEDESTRIAN ENVIRONMENT

- → Poor accessibility and safe walking routes to and from Station
- → Underpass on eastern side back-tracks from natural desire lines
- → Historic design “all roads lead to waterloo” has made pedestrian environment more hostile while accounting for growing vehicle use. Change in landuse development means car priority no longer sustainable.
- → Underpass plays a critical role as a local connector – particularly for school children

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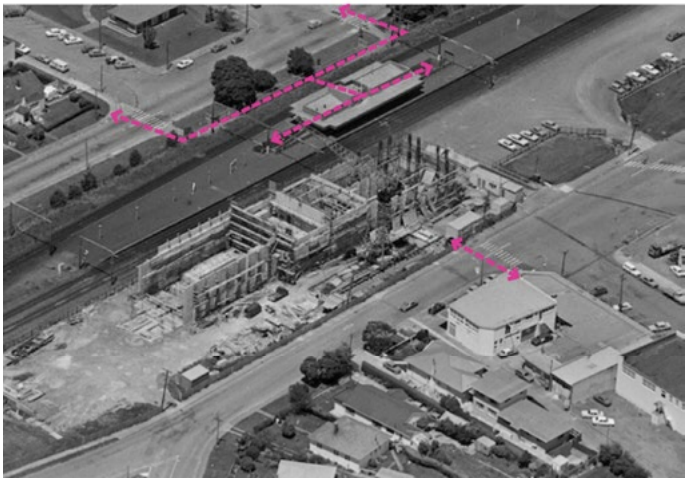

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

CONNECTIVITY
CYCLING ENVIRONMENT

- → Cycling well-suited to flat roads of the Hutt Valley but poor cycling infrastructure
- → Limited success with varied bike storage at station – convenience and visibility key
- → More bikes using the low quality bike storage than the new one due to proximity
- → Plans to extend cycleway to East-West link between Waterloo Station and Hutt City Centre (2024-2027 LTP)
- → Current cycleway to Naenae finishes in north/west park and ride car park

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

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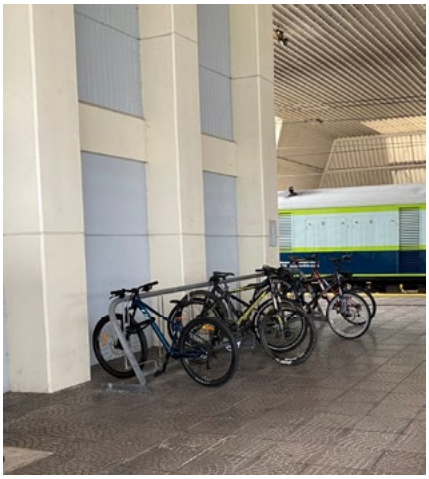


WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

CONNECTIVITY
SO WHAT?

Constraints

- → Station plays role of connectivity across suburb – underpass is key to that currently
- → Council control of roads and ownerships of land not all GWRC - risks of non-complimentary decisions by others?
- → Surface car parking isolates station
- → Significance of car parking as surrounding land use

Opportunities

- → Encourage cycling and support new routes by providing adequate storage
- → Use the station as a through connection for cycling – avoid conflict with train station commuters to improve current situation
- → Maximise station as a pedestrian connection as well as for commuters
- → Increase safety / improve CPTED by encouraging more activity at the station outside of peak hours
- → Provide a visual connection from east and west to improve walkability and sense of destination

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

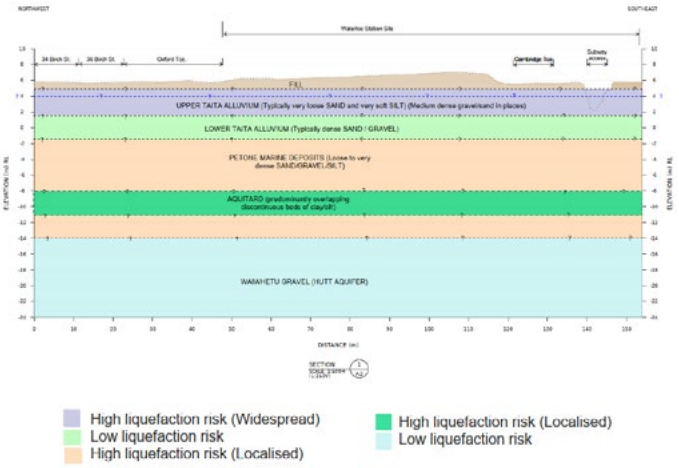
- Getting to and across the station 'island' - physical and visual connectivity
- Addressing the interfaces between station and adjacent urban edges and change
- Enabling multi modal interchange – buses
- Changing the balance of station land use [ownership?] – Car parks to future urban development
- Improving amenity of station and neighbourhood as a 'place'
- Bringing clearer contemporary reflection of 'garden'/green city
- Need for mana whenua and Council to be engaged – in a strategic way
- Planning for integration whilst protecting the GWRC project needs – future proofing

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

GEOTECH + STRUCTURES

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

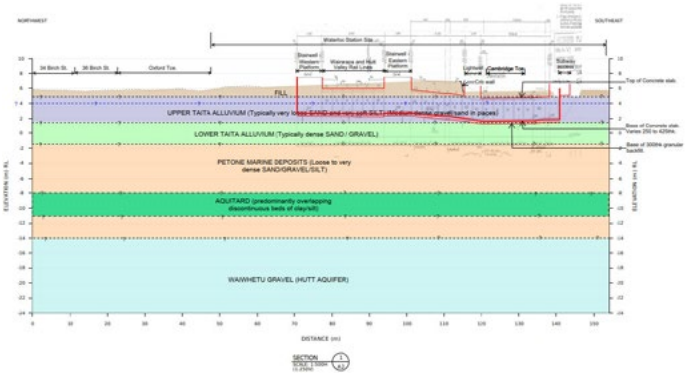
Ground Conditions



WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Geotechnical Challenges

- Founding conditions – suitable founding layer; variability of Lower Taita Alluvium; soft ground Upper Taita Alluvium
- Kinematic forces on piled foundations and buried structures (cyclic displacement; lateral spread unlikely).
- Liquefaction induced sand boils
- Liquefaction induced uplift forces – existing subway, new subway?
- Settlement – building performance; forces on piles.
- Aquifer – typically ok with WW if founded above aquitard.
- Soil contamination – disposal costs! Sometimes a real driver for foundation type.
- Liquefaction trigger – what level of shaking does this happen?

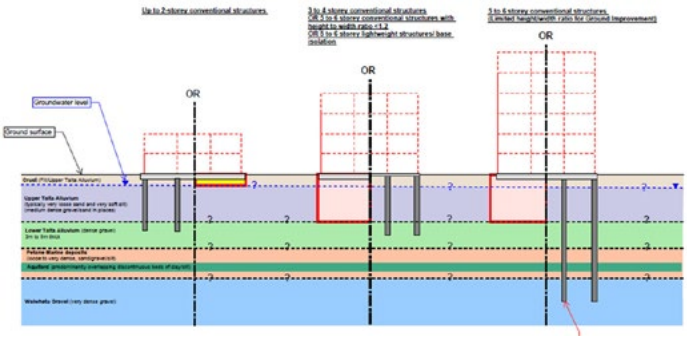


WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Ground/Foundations

Aquifer

- Foundations
  - Float above (light building) -$ -unlikely in our case
  - shallow piles (larger building, distributed bracing) -$$
  - Deep Piles (most flexibility re superstructure) - $$$
  - Ground improvement - $$$ (may be required locally for shallow piles option)
- Influence on building weight & distribution of bracing



WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Demolition

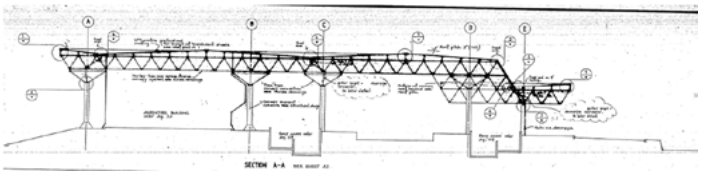
Existing Structure and Foundations

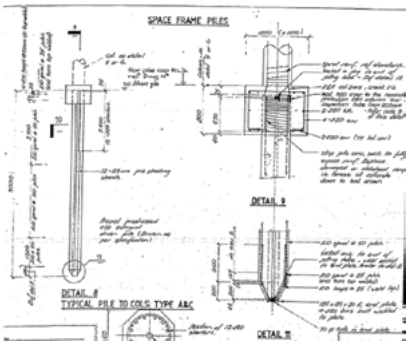
- Space truss (existing roof) will be difficult to demolish compared to a conventional roof.

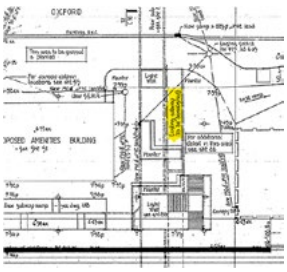
  Less redundancy/ cantilever capacity to demo in small sections.

- Existing foundations already in ground
- Possibility to reuse existing foundations ? (Needs consideration of durability, levels, grid etc)

The canopy has a 2-degree telecommunications installation on the roof which relies on elements of the spaceframe for structural support.



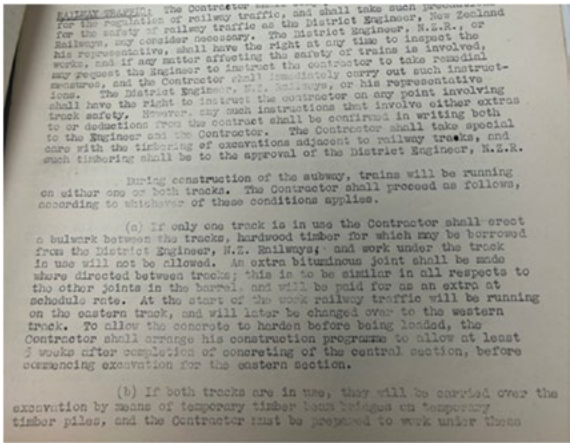




WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Construction Staging

- Exclusion zones
- Form influenced by size of components/ buildability sequence
- Subway stability/temporary works



RAILWAY TRAFFIC: The Contractor [illegible] and shall take such precautions for the regulation of railway traffic, and shall take such precautions for the regulation of railway traffic as the District Engineer, New Zealand Railways, may consider necessary. The District Engineer, N.Z.R., or his representative, shall have the right at any time to inspect the works, and if any matter affecting the safety of trains is involved, may request the Engineer to instruct the Contractor to take remedial measures, and the Contractor shall immediately carry out such instructions. The District Engineer, N.Z. Railways, or his representative shall have the right to instruct the contractor on any point involving track safety. However, any such instructions that involve either extra to or deductions from the contract shall be confirmed in writing both to the Engineer and the Contractor. The Contractor shall take special care with the timbering of excavations adjacent to railway tracks, and such timbering shall be to the approval of the District Engineer, N.Z.R.

During construction of the subway, trains will be running on either one or both tracks. The Contractor shall proceed as follows, according to whichever of these conditions applies.

(a) If only one track is in use the Contractor shall erect a bulwark between the tracks, hardwood timber for which may be borrowed from the District Engineer, N.Z. Railways; and work under the track in use will not be allowed. An extra bituminous joint shall be made where directed between tracks; this is to be similar in all respects to the other joints in the barrel, and will be paid for as an extra at schedule rate. At the start of the work railway traffic will be running on the eastern track, and will later be changed over to the western track. To allow the concrete to harden before being loaded, the Contractor shall arrange his construction programme to allow at least 3 weeks after completion of concreting of the central section, before commencing excavation for the eastern section.

(b) If both tracks are in use, they will be carried over the excavation by means of temporary timber beam bridges on temporary timber piles, and the Contractor must be prepared to work under these

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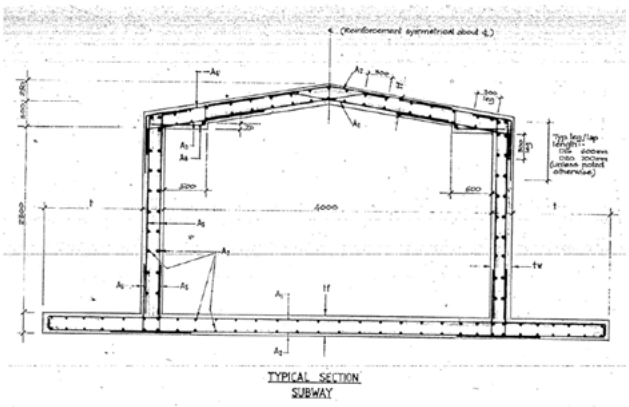
Subway

- Currently under both track and roadway
- Seismic performance will need to be assessed. Timeframe?
- Strengthening may be difficult wrt continued operation.
- Existing and previous subway influence positions of new foundations.



WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Wellington Water & Kiwirail

- Piling/Vibration close to existing building and tracks
- Existing services routes influencing foundation postions/options
  - Accessibility to services in future
  - Access restrictions construction & following
- Likely performance of existing building
  - (Strengthening of ground & building at some stage?)

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Questions

- Importance Level
  - Post disaster function
  - “Principal” Railway Station
  - Daycare (<150children)
- Future
  - Design Life – 50 years standard
    - Materiality
- Seismic Load
  - NZ1170.5/NSHM

2	Normal structures and structures not in other importance levels	Buildings not included in Importance Levels 1, 3 or 4 Single family dwellings Car parking buildings
3	Structures that as a whole may contain people in crowds or contents of high value to the community or pose risks to people in crowds	Buildings and facilities as follows: (a) Where more than 300 people can congregate in one area (b) Day care facilities with a capacity greater than 150 (c) Primary school or secondary school facilities with a capacity greater than 250 (d) Colleges or adult education facilities with a capacity greater than 500 (e) Health care facilities with a capacity of 50 or more resident patients but not having surgery or emergency treatment facilities (f) Airport terminals, principal railway stations with a capacity greater than 250 (g) Correctional institutions (h) Multi-occupancy residential, commercial (including shops), industrial, office and retailing buildings designed to accommodate more than 5000 people and with a gross area greater than 10 000 m^2 (i) Public assembly buildings, theatres and cinemas of greater than 1000 m^2 Emergency medical and other emergency facilities not designated as post-disaster Power-generating facilities, water treatment and waste water treatment facilities and other public utilities not designated as post-disaster Buildings and facilities not designated as post-disaster containing hazardous materials capable of causing hazardous conditions that do not extend beyond the property boundaries
4	Structures with special post-disaster functions	Buildings and facilities designated as essential facilities Buildings and facilities with special post-disaster function

PRE-CONSTRUCTION

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Waterloo Station
Pre-Construction

Items to be considered

- Proximity of works to railway and overhead gantries
- What level of service must be maintained during construction
  - LoS for station operation
  - Los for bus operation
  - Number of carparks to be available
  - Other users
- Scale of the works
  - Shelters over the platform or over the railway as well
  - Do platforms have to be reconfigured or just resurfaced
- Areas required for construction including lay down areas and any site portacoms
- Proximity of water treatment plant and other utilities
- Temporary works
- Any requirements impacting order of demolition.
- Future phasing to integrate with TOD and Bus Interchange

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Waterloo Station
Pre-Construction

Possible Options

- Use of temporary platforms
- Construct new station to the south or north and when completed demolish existing station.
- Close station during works and divert passengers to Woburn and Epuni station
- Sequencing works to minimise impact to station and rail operations
- Utilising Block of Lines and other Line Closures
- Maximise the use of offsite prefabrication

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QUANTITY SURVEYO

CONFIDENCE TODAY INSPIRES TOMORROW

RIDER LEVETT BUCKNALL

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We continue this successful legacy with our dedication to the value, quality and sustainability of the built environment. Our innovative thinking, global reach, and flawless execution push the boundaries. Taking ambitious projects from an idea to reality.

FORECAST 111

Prepared by the New Zealand Institute of Economic Research (Inc.) exclusively for Rider Levett Bucknall, Forecast is produced quarterly and provides detailed local construction market intelligence and knowledge.

CONSTRUCTION MARKET INTELLIGENCE

Forecast is supplemented by Rider Levett Bucknall's construction market intelligence publication, the Oceania Market Intelligence Update and other country specific reports providing timely snapshots of market conditions and construction cost movements around the world, via commentaries from Rider Levett Bucknall directors in key locations.

KEY POINTS IN THIS ISSUE

Construction demand remains weak, but the outlook for construction remains positive. The latest NZIER *Quarterly Survey of Business Opinion* (QSBO) shows building sector firms feeling the most buoyant about the general economic outlook despite these firms reporting weak demand in their own business in the December quarter.

Emerging signs of a recovery in construction demand

Building Work Put in Place showed construction activity continued to fall in the September 2024 quarter, driven by a contraction in both residential and non-residential construction. Consent issuance suggests a tentative recovery in construction demand, but the pipeline of building work remains subdued.

Building sector firms now feeling positive about the outlook ahead

Confidence in the building sector has rebounded over the past year, with a net 29 percent of building sector firms expecting an improvement in general economic conditions in the coming months. This is a sharp turnaround in sentiment from the first half of 2024, when over half of building sector firms expected a deterioration in the general economic outlook.

Pricing power remains weak in the sector despite upbeat mood

Construction cost inflation has continued to fall, reflecting further easing in capacity pressures in the sector. Cost pressures in the construction sector are easing, and their pricing power remains weak. Profitability in the construction sector also remains soft. These developments suggest a further easing in construction cost inflation over the coming year.

Future outlook

With the Reserve Bank of New Zealand (RBNZ) cutting the Official Cash Rate (OCR) sharply since August, lower interest rates are starting to support a recovery in construction demand. The recent acceleration in the number of New Zealanders leaving the country continues to present downside risks to the longer-term construction outlook.

BUILDING ACTIVITY TRENDS

Stats NZ's *Building work put in place* showed construction activity continued to fall in the September 2024 quarter. The volume of residential construction declined by 3.5 percent in the September quarter, while the volume of non-residential construction fell by 2.8 percent over that same period. The continued weakness in construction activity had been indicated by the soft pipeline of construction seen in recent years, as reflected in consent issuance and architects' measure of activity in their own office.

The weakness in construction activity was broad-based across the regions but was particularly evident in the main centres in the North Island: Auckland, Waikato and Wellington. This weakness likely reflects the dampening effects of the earlier increases in interest rates on construction demand in these regions. Despite the recent weakness, Auckland has grown faster than the other regions and continues to be the dominant driver of construction activity.

The weakness in construction activity in the North Island main centres over the past year is also reflected in regional concrete sales data. In particular, the production of ready-mixed concrete in the Wellington metropolitan area fell 7.3 percent for the year to September 2024, relative to the previous year.

Public sector cutbacks are likely to have exacerbated the negative impact of the earlier increases in interest rates on construction demand in Wellington. Heightened uncertainty weighed on confidence and, in turn, appetite to invest in buildings in the region.

Dwelling consent issuance data suggest construction activity will stabilise at a lower level for the coming year. The annual number of dwelling consents issued plateaued at 33,609 for the year to November 2024. While this annual total is similar to the trend in recent months, it is still around twelve percent lower than year-ago levels.

Residential construction demand differed across the building types, with a lift in consents issued for standalone houses in recent months. In contrast, consent issuance for higher density housing such as apartments, townhouses and flats has been soft over this period. Although lower interest rates should improve the financial feasibility of housing developments, for now, there remains caution about getting large-scale developments underway. The recent introduction by the Government of the Residential Development Underwrite (RDU) should reduce some of the barriers to access to finance for established developers, given the underwriting of the financing of selected development projects[1]. Given that developments in the main centres (Auckland, Hamilton,

1 https://www.hud.govt.nz/our-work/residential-development-underwrite

Tauranga, Wellington and Christchurch) are more likely to meet the eligibility requirements of the RDU, these areas will likely see an earlier recovery in residential construction demand.

For now, there are emerging signs of a recovery in residential construction demand in Auckland as dwelling consent issuance picked up slightly in the region. This is in contrast to the continued decline in dwelling consent issuance in Wellington and Waikato.

Given housing demand in Auckland tends to lead the other regions, we expect the recovery in residential construction demand to broaden across New Zealand beyond 2025. Lower interest rates and improved availability of labour in the construction sector will be key supports for this recovery in construction activity.

Non-residential consent issuance also points to continued soft construction demand for the coming year. Total non-residential consent issuance fell slightly by 1.6 percent for the year to November 2024, relative to year-ago levels. The weakness was driven by a decline in industrial building construction demand, particularly storage buildings.

Across the regions, the drop in non-residential construction demand over the past year was most apparent in Waikato, largely reflecting a decline in demand for storage buildings in the region. Although global dairy prices recovered over the past year, broader weakness in general economic conditions has weighed on demand for warehousing.

Non-residential construction demand in other central North Island regions, including the Bay of Plenty, Hawke's Bay and Taranaki, has also been soft. In contrast, there are signs of a recovery in non-residential consent issuance in Wellington and Canterbury.

BUILDING ACTIVITY OUTLOOK

Although the near-term outlook for construction remains weak, there is confidence about a recovery in construction demand beyond 2025. Lower interest rates are supporting a rebound in sentiment and expectations of stronger activity, with building sector firms now feeling the most buoyant of the sectors surveyed in the latest NZIER *Quarterly Survey of Business Opinion* (QSBO).

A net 29 percent of building sector firms are expecting an improvement in general economic conditions over the coming months. This is a sharp turnaround from the first half of 2024 when over half of building sector firms were expecting a deterioration in the general economic outlook. The rebound in building sector confidence is also remarkable, given the continued weak demand reported by firms in the sector, as reflected in the contraction in new orders and output in the December 2024 quarter.

However, firms reported weak demand put downward pressure on prices in the building sector in the December 2024 quarter. This is contributing to continued weak profitability in the building sector despite firms reporting an easing in cost pressures. Overall, these developments suggest a further easing in construction cost inflation over the coming year.

Te Waihanga, the New Zealand Infrastructure Commission, reported in its *Pipeline snapshot*[2] for the September 2024 quarter that infrastructure projects totalled $143.6 billion in value. Of this, around $45.7 billion is estimated to be under construction and $9.9 billion in procurement. Seventeen projects that cost over $1 billion, known as 'mega-projects', make up 15% of this pipeline.

The $3.4 billion decline in the value of infrastructure projects in the pipeline relative to the June quarter largely reflected decreases in existing project values, as well as the completion of projects in the pipeline.

Transport infrastructure remains a dominant part of the pipeline, with the value of such projects totalling $78.5 billion. Water and energy infrastructure also formed a substantial part of the pipeline, totalling $25.6 billion and $9 billion, respectively.

Around $13.7 billion of the pipeline is projected to be spent in the 2025 year, while around three-quarters of the pipeline is expected to be spent within the next six years. Spending on transport infrastructure (which includes road, rail, ports and airports) dominates the pipeline, with this spending expected to remain above $4.5 billion until 2030 and makeup around 48.6 percent of infrastructure spend across the sectors for the next ten years.

Spending on water infrastructure is led by the water services delivery plans of local councils and is expected to be between $1 billion to $2.4 billion per year until 2032, before dropping to an estimated annual spend of $0.4 billion.

ECONOMIC BACKDROP

The Stats NZ release of September 2024 GDP showed a 1 percent decrease in New Zealand economic activity for the quarter. Besides the weak outturn for the quarter, Stats NZ also made historical revisions to the GDP data. These included a downward revision to June quarter GDP to a 1.1 percent decrease (from a previous decrease of 0.2 percent) but an upward revision to the level of GDP prior to the June 2024 quarter.

For the September 2024 quarter, weakness in manufacturing was the major contributor to the decline in GDP, followed by professional, scientific, technical, administrative and support services and construction. The release confirmed that the New Zealand economy had been weak last year, even with the income tax cuts since July and the RBNZ's OCR cuts since the August meeting. With annual average GDP growth of just 0.1 percent for the year to September 2024, this indicates weak momentum in the New Zealand economy driven by the high interest rates earlier in the cycle.

However, the start of the monetary policy easing cycle by the RBNZ in August has boosted business confidence. A net 9 percent of firms surveyed in the December NZIER QSBO expected an improvement in general

2 https://tewaihanga.govt.nz/the-pipeline/pipeline-snapshot

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economic conditions over the coming months on a seasonally adjusted basis, a contrast from the net 4 percent feeling downbeat about the outlook in the previous quarter.

The continued improvement in sentiment was despite firms' own trading activity remaining weak in the December quarter. A net 26 percent of firms reported reduced activity in the December quarter on a seasonally adjusted basis, but a net 9 percent expect a lift in activity in the next quarter.

Across the sectors, the theme in the latest NZIER QSBO was one of improved confidence amongst firms despite continued weak demand in their own business. Besides the upbeat building sector, retailers also felt positive about the general economic outlook despite subdued sales activity in the December quarter.

Although retail sector profitability remains weak, there are tentative signs of a turnaround. Many households will face reduced mortgage repayments over the coming year as they roll off their fixed-term mortgage rates, given the sharp decline in interest rates since August 2024. This should free up discretionary income and support a recovery in retail spending.

There are widespread expectations amongst services sector firms surveyed in the NZIER QSBO that interest rates will continue to decline over the coming year. In particular, almost all firms surveyed in the financial services sector expect interest rates to be lower in a year's time. Across the services sector, although demand remained soft, expectations are for a pick-up in activity in the next quarter.

Despite the optimism about an improvement in economic conditions, firms remain cautious when it comes to hiring and investment. A net 17 percent of firms reduced staff numbers in the December quarter, although a net 5 percent expect to hire in the next quarter. When it comes to investment plans for the coming year, a net 14 percent intend to reduce investment in buildings, while a net 5 percent intend to reduce investment in plant and machinery. Despite expectations of a recovery in activity, firms look to be holding off on investment until they have more conviction about a sustained improvement in demand.

The slowing in the New Zealand labour market has driven a turnaround in net migration over the past year. Stats NZ estimates annual net migration inflows slowed sharply to 38,800 for the year to October 2024. This slowing in net inflows reflects fewer people moving to New Zealand from other countries, while the number of New Zealanders moving across the Tasman in search of better job prospects has accelerated. A continued easing in net migration poses downside risks to longer-term construction demand.

INTEREST AND EXCHANGE RATES

The continued easing in inflation pressures in the New Zealand economy supported the RBNZ's aggressive pace of OCR cuts since it started its monetary policy easing in August. It followed up its 25 basis point OCR cut in August with consecutive 50 basis point OCR cuts in its October and November meetings. The central bank indicated it intended to cut the OCR by another 50 basis points at its February 2025 meeting should inflation and broader economic developments evolve in line with their projections.

The continued easing in inflation pressures suggests the RBNZ will follow through with its 50 basis point OCR cut in February. However, these expectations are tempered by renewed concerns about inflation in the US and the implications for interest rates staying higher for longer.

The December 2024 US consumer price inflation data showed prices 2.9 percent higher than year-ago levels, while core (excluding food and energy) inflation increased 3.2 percent over the year. The resilience of the US economy, along with concerns that incoming US President Trump's policies may stoke inflation, has increased speculation that the US Federal Reserve might pause its easing cycle for an extended period of time.

Meanwhile, the Bank of England is on track to resume its monetary policy easing over the coming year, given recent data showing an easing in inflation in the United Kingdom.

Overall, the expected faster pace of monetary policy easing by the RBNZ relative to the other major central banks has made the New Zealand dollar less attractive from a yield perspective. These developments have put continued downward pressure on the New Zealand dollar, with the NZD/USD falling below 57 cents.

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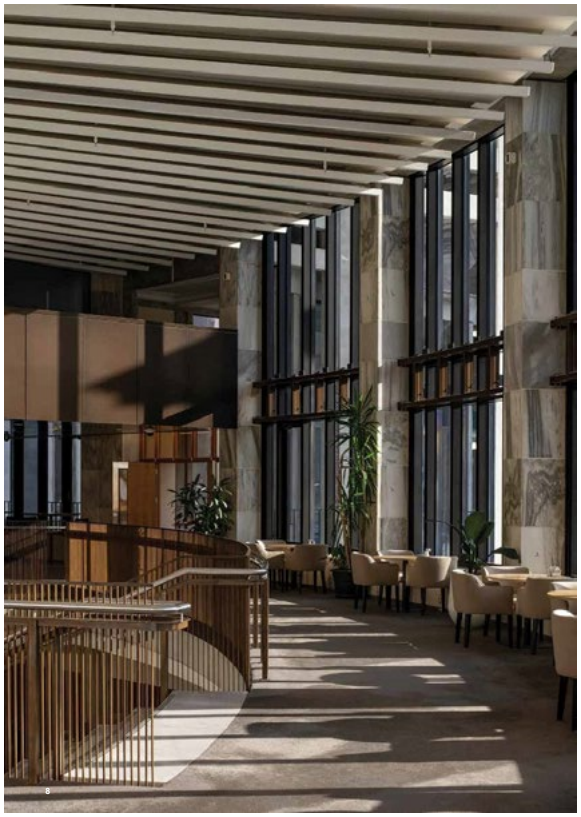

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BUILDING INVESTMENT

Despite firms feeling optimistic about an improvement in demand, there remains caution when it comes to investment. In particular, a net 14 percent of firms plan to reduce investment in buildings over the coming year.

BUILDING CONSENTS

Although consent issuance for office buildings increased sharply for the year to November 2024, this was more than offset by a broad-based decline in consent issuance across storage buildings, education facilities, accommodation and retail outlets.

Overall, demand for non-residential construction remains soft.

Building consents by sector

There was a substantial increase in consent issuance for both new and alterations to office buildings over the past year. This demand has been particularly strong in Auckland and Wellington. Lower interest rates should support office construction demand later this year.

In contrast, consent issuance for storage buildings fell sharply over the year to November 2024. Demand for storage buildings was weak across most regions, particularly in Auckland and Waikato. This likely reflects the effects of weak demand in the New Zealand economy more broadly, which is weighing on logistics activity.

The fall in consent issuance for education facilities over the past year reflected reduced demand for new buildings, with this decline broad-based across the regions, including Canterbury and Auckland.

Meanwhile, the decline in consent issuance for new accommodation buildings largely reflected weaker demand in Auckland.

The NZIER QSBO architects' measure of work in their own office indicates that while architects expect the pipeline of construction work to remain soft over the coming year, expectations are for a recovery over the longer term.

A third of architects surveyed expect an increase in the pipeline of housing construction over the coming twelve to 24 months, while a net 24 percent of architects expect a lift in commercial construction over this period. Lower interest rates should support a recovery in construction demand over the longer term, as the reduced cost of borrowing allows more construction projects to become financially feasible.

Building consents by region

Across the regions, Waikato and the Bay of Plenty have been the key drivers of weaker non-residential construction demand over the past year. The weakness in non-residential consent issuance in Waikato reflects a particularly large decline in demand for storage buildings. Although the recovery in global dairy prices means improved farmgate returns, broader weakness in economic activity is likely to have weighed on logistics demand and, in turn, the construction of new storage buildings.

Meanwhile, the decrease in non-residential construction demand in the Bay of Plenty over the past year was largely driven by reduced consent issuance for healthcare facilities and retail outlets.

In contrast, non-residential consent issuance in Wellington and Canterbury rose over the past year. The growth in demand for non-residential construction in Wellington continued to be driven by stronger demand for office and industrial buildings. Despite the negative impacts on economic activity in the region from the recent public sector cutbacks, the latest NZIER QSBO shows a bounce-back in business confidence in the region. The recent cuts to interest rates are likely to support a recovery in demand.

Lower interest rates are also likely to be supporting a recovery in demand for non-residential construction in Canterbury, with particularly robust increases in consent issuance for social and industrial buildings over the past year.

Parliament Executive Wing Façade, Wellington

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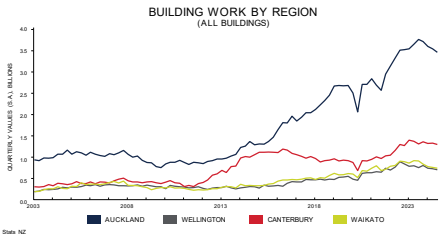
FIGURE 1

Construction eased across most regions

Quarterly value, $ billions

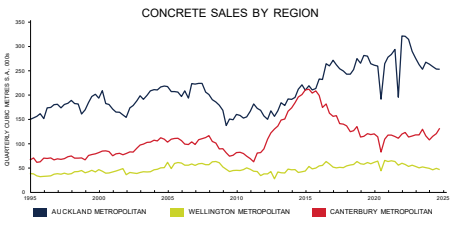


Source: Stats NZ

FIGURE 2

Weaker concrete sales in Auckland reflect subdued construction activity

Quarterly cubic metres, thousands



Source: Stats NZ

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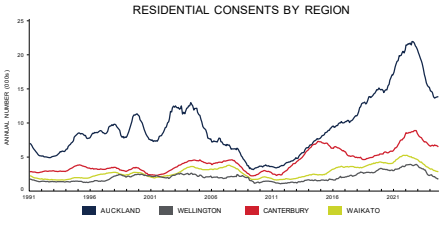
FIGURE 3

Residential construction demand remains weak in the near term

Annual number, thousands

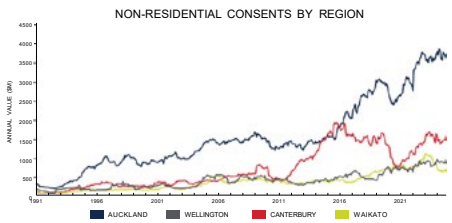


Source: Stats NZ

FIGURE 4

Non-residential construction demand soft in Auckland and Waikato

Annual value, $ millions



Source: Stats NZ

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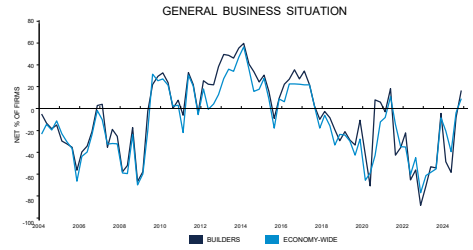
FIGURE 5

Building sector is now the most upbeat
Net %of firms



Source: NZIER

Watercare's Central Interceptor project, Auckland

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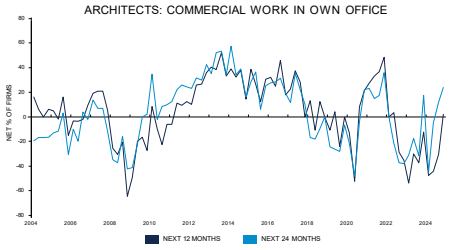
FIGURE 6

Improved pipeline of construction over the longer term
Net %of firms



Source: NZIER

TABLE 1

Non-residential building consents by region and sector
$m of consents for the year ending May 2024; red colour shading for a decline in consents from the previous year

	SECTOR									
REGION	HOSTELS, PRISONS ETC	ACCOMODATION	HEALTH	EDUCATION	SOCIAL, CULTURAL, RELIGIOUS	RETAIL	OFFICE	STORAGE	INDUSTRIAL	FARM
NORTHLAND	1.5	18.6	84.3	65.4	15.2	12.0	17.6	35.1	21.2	18.3
AUCKLAND	144.6	75.0	582.2	349.6	186.4	293.3	995.6	479.5	481.3	25.4
WAIKATO	4.4	20.1	103.7	75.9	40.1	87.0	33.5	121.1	133.5	49.6
BAY OF PLENTY	2.5	10.1	40.3	72.2	87.3	71.0	108.0	70.9	54.2	15.8
GISBORNE	0.7	0.1	0.1	13.3	10.0	14.5	4.0	2.1	6.9	2.0
HAWKE'S BAY	0.6	1.6	31.5	41.3	17.1	23.1	24.3	60.3	31.8	6.4
TARANAKI	0.0	0.5	2.7	21.8	24.0	12.5	10.5	20.3	24.6	11.2
MANAWATŪ-WHANGANUI	3.8	10.9	29.2	28.5	7.7	29.3	15.5	121.3	15.6	12.8
WELLINGTON	5.6	5.6	70.6	132.7	141.8	64.6	412.3	17.3	119.4	10.0
NELSON	0.0	1.2	10.8	10.2	0.3	16.0	10.2	4.7	12.5	0.1
TASMAN	4.4	0.7	1.5	1.3	1.7	25.3	13.9	9.9	13.0	4.1
MARLBOROUGH	0.8	3.0	1.8	2.8	1.3	15.1	3.5	12.0	19.8	7.3
WEST COAST	1.6	0.6	12.8	2.5	4.5	2.8	5.5	0.3	3.0	3.0
CANTERBURY	10.8	22.5	126.3	222.3	407.3	153.8	124.2	267.3	215.5	48.7
OTAGO	4.4	40.7	248.1	60.7	97.7	49.5	63.4	31.6	62.7	18.2
SOUTHLAND	0.8	28.9	0.9	24.6	3.9	12.3	4.9	14.1	30.4	17.3

Source: Statistics NZ, NZIER

BUILDING COSTS

The Capital Goods Price Index for Non-Residential Buildings (CGPI-NRB) is an official measure of cost movements in the sector. The CGPI-NRB excludes GST, and we use it as an indicator of cost escalation.

The CGPI-NRB is a national average across all building types. Therefore, we advise caution when applying the increase in the CGPI-NRB as an indicator of cost escalation for specific projects.

Non-residential construction cost inflation eased further in September 2024, with the 0.7 percent increase over the quarter bringing annual inflation in non-residential construction costs to 3.2 percent. This continued easing in non-residential construction cost inflation reflects a further easing in capacity pressures, with 87 percent of building sector firms reporting weak demand as being the primary constraint for their business in the latest NZIER QSBO.

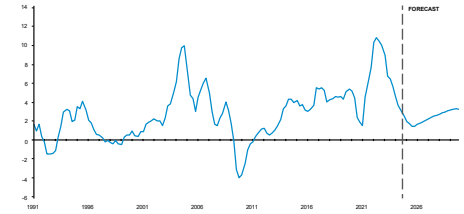
We forecast non-residential construction cost inflation to continue easing for the coming year, given the weak near-term pipeline of non-residential construction. The NZIER QSBO also points to continued weak pricing pressures in the building sector. However, with signs that non-residential construction demand will pick up beyond 2025, we expect this to support a recovery in non-residential construction cost inflation over the longer term.

We forecast annual non-residential construction cost inflation to ease to around 1.5 percent over the coming year before picking up next year.

FIGURE 7

Non-residential building cost inflation

CGPI-NRB, annual % change



Source: Statistics NZ, NZIER forecasts

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TABLE 2

Non-residential building cost index[3]

YEAR	QUARTER	INDEX	QUARTERLY % CHANGE	ANNUAL % CHANGE
2021	MARCH	862	0.4	1.6
	JUNE	889	3.1	4.6
	SEPTEMBER	905	1.8	6.3
	DECEMBER	925	2.2	7.7
2022	MARCH	951	2.8	10.3
	JUNE	985	3.6	10.9
	SEPTEMBER	1000	1.5	10.5
	DECEMBER	1018	1.8	10.1
2023	MARCH	1037	1.9	9.0
	JUNE	1052	1.4	6.8
	SEPTEMBER	1065	1.2	6.5
	DECEMBER	1076	1.0	5.7
2024	MARCH	1085	0.8	4.6
	JUNE	1091	0.6	3.7
	SEPTEMBER	1099	0.7	3.2
	DECEMBER	1104	0.4	2.6
2025	MARCH	1107	0.3	2.0
	JUNE	1111	0.4	1.8
	SEPTEMBER	1115	0.4	1.5
	DECEMBER	1120	0.4	1.5
2026	MARCH	1125	0.5	1.7
	JUNE	1131	0.5	1.8
	SEPTEMBER	1137	0.5	2.0
	DECEMBER	1144	0.6	2.1
2027	MARCH	1151	0.6	2.3
	JUNE	1158	0.6	2.4
	SEPTEMBER	1166	0.7	2.5
	DECEMBER	1174	0.7	2.7
2028	MARCH	1183	0.7	2.8
	JUNE	1192	0.8	2.9
	SEPTEMBER	1201	0.8	3.0
	DECEMBER	1210	0.8	3.1
2029	MARCH	1220	0.8	3.2
	JUNE	1231	0.8	3.3
	SEPTEMBER	1241	0.8	3.3
	DECEMBER	1250	0.7	3.2

Notes: The current and forecast CGPI-NRB is a national average, which does not differentiate between regions or building types. We therefore advise caution in applying the increase in the CGPI-NRB as a measure of cost escalation for specific building projects.

Source: Statistics NZ, NZIER forecasts

3 Stats NZ has reweighted and rebased capital goods price indexes in the December 2022 quarter. The update includes structural changes to better align with the national accounts. As a result, there has been historical revisions to the index levels. This does not affect the percentage changes each quarter. Further detail on these historical revisions can be found at: https://www.stats.govt.nz/methods/price-index-methods-updates-for-the-december-2022-quarter/

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

RLB CRANE INDEX®

Q1 – 2025 23RD EDITION

Rider Levett Bucknall

Q1 2025 RLB CRANE INDEX® HIGHLIGHTS

- Cranes across the seven centres now total 105, a fall of 19 cranes.
- The Auckland crane index fell 23.5% since Q3 2024 and is at its lowest count since Q3 2016.
- The Wellington crane index has slightly recovered from the record low recorded in Q3 2024 with an additional three long-term cranes added.
- Only Queenstown and Wellington saw long-term crane numbers increase.
- After the fall of the residential index in Q3 2024 to its lowest level since Q3 2015, the index rose 18 points, representing 26 cranes across the key centres.
- The non-residential index continued its fall and reduced by 40 index points from 179 points in the last edition (from 102 to 91 cranes).
- The proportion of residential cranes across New Zealand is now less than 25% of all long-term cranes in the key centres, up slightly from the 17.7% recorded in the last edition.
- Civil cranes now number 26 cranes across the centres, the same number of long-term cranes as the residential sector.
- With ten cranes on-site, the Te Kaha Christchurch Stadium continues to have the greatest number of long-term cranes on a single site in the country.

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Q1 – 2025 23RD EDITION

The New Zealand construction industry is currently facing significant challenges, reflecting broader economic and policy shifts. Over the past six months, there has been a notable 15.3% net drop in crane usage across the major centres, with Auckland's long-term crane numbers falling by 23.5%, which is not surprising given the ongoing issues in the market. A major concern is the lack of project commitment beyond the design stages, a problem that has persisted throughout 2024.

Construction GDP fell by 3.1% in the December 2024 quarter and has been declining since the March 2024 quarter. Throughout 2024, the government reviewed capital works spending across the education, health, and social housing sectors following budget blowout concerns and a high inflationary environment. This review and the halting of many live projects have now resulted in a scarcity of on-site projects and forward pipelines in these areas, with only a handful of long-term cranes operating in New Zealand in these sectors currently. The commercial market has also been afected, with high interest rates and reduced valuations drying up the pipeline over the last two years, which is again seeing limited on-site work replacing the projects now completing.

The residential sector has struggled since early 2023. The pipeline of multi-unit residential projects progresses slowly, and small townhouse subdivisions have significantly reduced, given the large amount of unsold new stock.

Work put in place across the country saw a fall of $2.3 billion or -6.4% for the 2024 calendar year, with residential work contributing $2.4 billion to the overall decrease in work. Activity increases were seen across the non-residential sectors, especially in the health and cultural subsectors.

Consents across New Zealand fell by $1.5 billion, or 5.1%, during CY 2024, almost entirely due to the drop in residential consents, which was $1.4 billion, or 7.2%.

Auckland's market appears to be at its lowest point, but with major infrastructure projects such as the City Rail Link and the Central Interceptor nearing completion, a consistent pipeline of major vertical building and horizontal infrastructure projects is required. New data centres of increasing scale continue to be planned in the pipeline, although there has been a noticeable drop in current data centre long-term crane activity from seven to one long-term crane. There are early signs of recovery with some large roading and water infrastructure projects, but these will take significant time to plan before on-site activity and new cranes are required. Contractors, sub-contractors, and consultants are facing tough times, and the upcoming May 2025 government budget is crucial for the construction industry. This will help shape the 2026 project pipeline and mark the halfway point of the government's current three-year tenure.

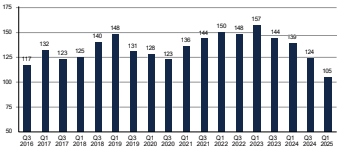
Q1 2025 RLB CRANE INDEX® SUMMARY

CITIES	KEY SECTORS	
AUCKLAND ↗	AGED CARE ↘	HEALTH ↗
CHRISTCHURCH →	CIVIC ↘	HOTEL ↘
DUNEDIN ↗	CIVIL ↗	MIXED USE →
HAMILTON →	COMMERCIAL ↗	RECREATION →
QUEENSTOWN ↘	DATA CENTRE / INDUSTRIAL ↗	RESIDENTIAL ↘
TAURANGA ↗	EDUCATION ↗	RETAIL ↗
WELLINGTON ↘		

LEGEND: ↗ INCREASE IN NUMBER OF CRANES; ↘ DECREASE IN NUMBER OF CRANES; → CRANE NUMBERS STEADY

CRANE ACTIVITY - NEW ZEALAND

NUMBER OF CRANES



Q1 – 2025 23RD EDITION

Tier 1 contractors have seen several early contractor involvement (ECI) projects put on hold at the design, consent, or site enabling stages. When surveyed, they also indicated that few new cranes are expected in their near-future pipeline. Based on these insights, the construction industry and the future crane index are anticipated to face further declines in Q3 2025, with a slower forecast project pipeline and limited new consents and work in place.

Naylor Love, which had a record nine vertical-build cranes in Auckland in Q3 2024, now has only one. There is no obvious short-term pipeline for long-term crane projects. This situation underscores the broader challenges and uncertainties facing the New Zealand construction industry and its ability to plan and invest for the future.

There was a net decrease nationally of 19 long-term cranes (down 15.3%). Fifty cranes were removed from sites, while 31 new long-term cranes were placed on sites. The resultant RLB Crane Index® value has fallen to 133, the lowest value since Q1 2016. The index has fallen from the high of 199 in Q1 2023, a drop of 30%.

New Zealand's residential crane index value increased to reach 118 index points, up from the 100 points recorded in the previous edition. The current index value represents only 26 long-term cranes, down from the high of 76 recorded in Q3 2022. Residential cranes now make up only 24.8% of all cranes in New Zealand.

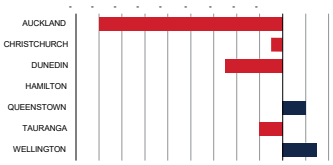
Queenstown and Wellington recorded increases, with an additional two and three long-term cranes, respectively.

CRANE ACTIVITY – NEW ZEALAND

	OPENING COUNT	%	MOVEMENT +	-	NET Q1 2025	CLOSING COUNT	% Q3 2024
AUCKLAND	68	54.8%	18	-34	-16	52	49.5%
CHRISTCHURCH	20	16.1%	2	-3	-1	19	18.1%
DUNEDIN	8	6.5%	0	-5	-5	3	2.9%
HAMILTON	2	1.6%	1	-1	0	2	1.9%
QUEENSTOWN	8	6.5%	6	-4	2	10	9.5%
TAURANGA	13	10.5%	0	-2	-2	11	10.5%
WELLINGTON	5	4.0%	4	-1	3	8	7.6%
TOTAL	124	100.0%	31	-50	-19	105	100.0%

NEW ZEALAND NET CRANE MOVEMENT BY CITY

NUMBER OF CRANES REMOVED / ADDED

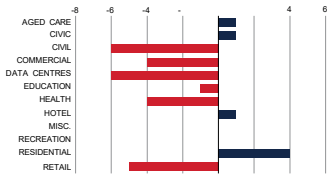


CRANE ACTIVITY – NEW ZEALAND BY SECTOR

	OPENING COUNT	%	MOVEMENT +	-	NET Q1 2025	CLOSING COUNT	% Q3 2024
AGED CARE	6	4.8%	4	-3	1	7	6.7%
CIVIC	5	4.0%	3	-2	1	6	5.7%
CIVIL	32	25.8%	8	-14	-6	26	24.8%
COMMERCIAL	17	13.7%	3	-7	-4	13	12.4%
DATA CENTRES	7	5.6%	0	-6	-6	1	1.0%
EDUCATION	5	4.0%	0	-1	-1	4	3.8%
HEALTH	9	7.3%	0	-4	-4	5	4.8%
HOTEL	1	0.8%	1	0	1	2	1.9%
MIXED USE	5	4.0%	2	-2	0	5	4.8%
RECREATION	10	8.1%	0	0	0	10	9.5%
RESIDENTIAL	22	17.7%	10	-6	4	26	24.8%
RETAIL	5	4.0%	0	-5	-5	0	0.0%
TOTAL	124	100.0%	31	-50	-19	105	100.0%

NET CRANE MOVEMENT BY SECTOR

NUMBER OF CRANES REMOVED / ADDED



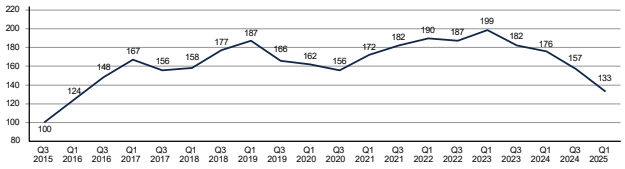
WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Q1 – 2025 23RD EDITION

RLB CRANE INDEX® – NEW ZEALAND

The New Zealand RLB Crane Index® fell by 15.3% to 133 index points, representing a reduction of 19 cranes.

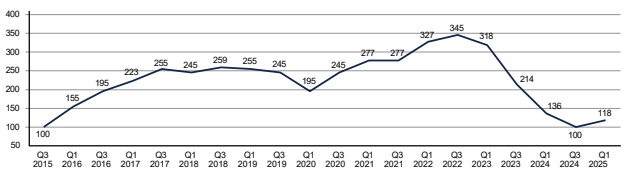
BASE: Q3 2015 = 100



RESIDENTIAL INDEX

The residential index has risen after falling in the last four editions since the high of Q3 2022. There are 26 residential long-term cranes across centres nationally.

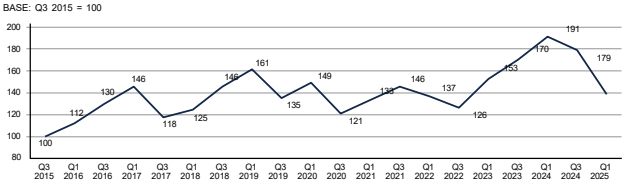
BASE: Q3 2015 = 100



NON-RESIDENTIAL INDEX

The non-residential index fell to 139 index points, a drop of 22.3% from 179 index points in the last edition. The index represents 79 non-residential long-term cranes across the major centres of New Zealand.

BASE: Q3 2015 = 100



Q1 – 2025 23RD EDITION

Auckland's RLB Crane Index® fell by 23%, from 206 index points to 158, representing a reduction of 16 long-term cranes across Auckland. This is the lowest level in nine years. There were 52 long-term cranes across Auckland for this edition, down from the previous count of 68. Eighteen cranes were placed on-site, and 34 were removed.

CRANE ACTIVITY – AUCKLAND

	OPENING COUNT	%	+	-	NET Q1 2025	CLOSING COUNT	%	Q3 2024
AGED CARE	5	7.4%	4	-2	2	7	13.5%	
CIVIC	0	0.0%	2	0	2	2	3.8%	
CIVIL	23	33.8%	6	-11	-5	18	34.6%	
COMMERCIAL	7	10.3%	1	-4	-3	4	7.7%	
DATA CENTRES	7	10.3%	0	-6	-6	1	1.9%	
EDUCATION	2	2.9%	0	-1	-1	1	1.9%	
HEALTH	2	2.9%	0	0	0	2	3.8%	
HOTEL	1	1.5%	1	0	1	2	3.8%	
MIXED USE	0	0.0%	0	0	0	0	0.0%	
RECREATION	0	0.0%	0	0	0	0	0.0%	
RESIDENTIAL	16	23.5%	4	-5	-1	15	28.8%	
RETAIL	5	7.4%	0	-5	-5	0	0.0%	
TOTAL	68	100.0%	18	-34	-16	52	100.0%	

KEY SECTORS

- AGED CARE
- CIVIC
- CIVIL
- COMMERCIAL
- DATA CENTRE / INDUSTRIAL
- EDUCATION
- HEALTH
- HOTEL
- RESIDENTIAL
- RETAIL

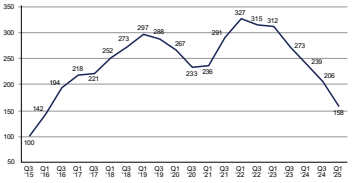
OVERALL STATUS

LEGEND

INCREASE IN NUMBER OF CRANES | DECREASE IN NUMBER OF CRANES | CRANE NUMBERS STEADY

RLB CRANE INDEX® – AUCKLAND

BASE: Q3 2015 = 100

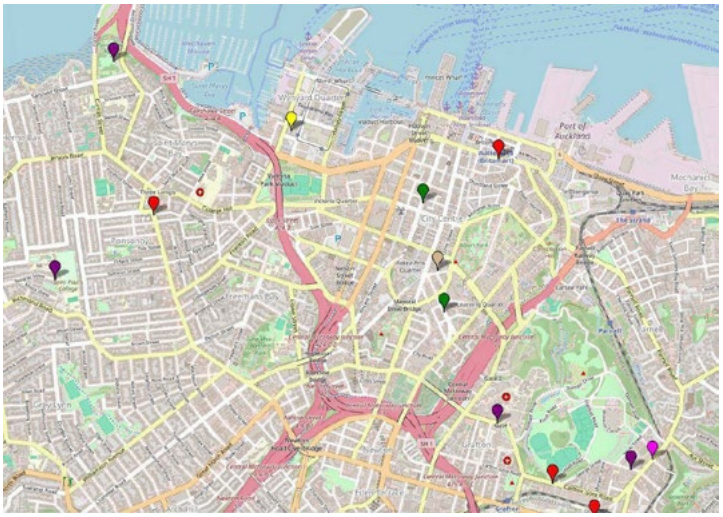


Q1 – 2025 23RD EDITION

This drop in overall crane numbers highlights the continued pressure on the residential market and the decline in residential construction activity. The residential crane sector has dominated in recent times in Auckland. However, the proportion of residential cranes rose from 23.5% of all long-term cranes in Q3 2023 to 28.8% in this edition.

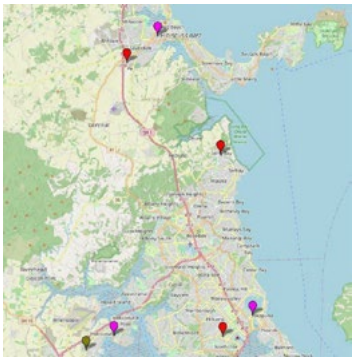
Currently, 15 long-term cranes are assisting residential construction activities on 12 projects. Most of these projects had cranes positioned on them during our last count. Only four new cranes commenced on residential projects for this edition. Many of the continuing projects will be nearing completion within the next six to 12 months, highlighting the potential for a significant absence of residential cranes towards the end of 2025.

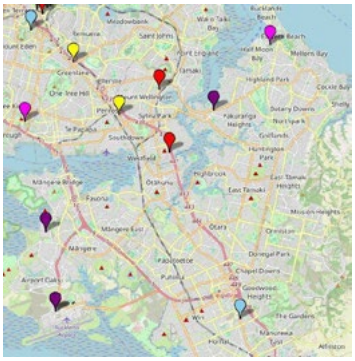
Auckland's market appears to be at its lowest point, but with major infrastructure projects such as the City Rail Link and the Central Interceptor nearing completion, a consistent pipeline of major vertical building and horizontal infrastructure projects is required. New data centres of increasing scale continue to be planned in the pipeline, although there has been a noticeable drop in current data centre long-term crane activity from seven to one long-term crane. There are early signs of recovery with some large roading and water infrastructure projects, but these will take significant time to plan before on-site activity and new cranes are required.



WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Q1 – 2025 23RD EDITION





Across Auckland, only five new residential long-term cranes commenced. These were positioned at:

- Simplicity Living Apartments (Mt Wellington)
- New Residential House (Orakei)
- Pompallier on Ponsonby (Ponsonby)
- Sero Apartments (Henderson)

The civil sector increased by six long-term cranes at the following projects:

- Watercare Central Interceptor (Mount Albert, three cranes)
- Watercare Central Interceptor (Western Springs)
- Watercare Central Interceptor Point Erin (Westhaven)
- ACG Parnell (Newmarket)

Total building consents also reflect the slowing of activity in Auckland. Overall, consents fell by 4.0% for the 2024 calendar year. Residential consents fell by 4.8%, and non-residential consents fell by 2.9%. These consent values correlate with the falling number of cranes across the Auckland region and point to a reduction in the forward construction pipeline, particularly in the vertical residential sector.

Stats NZ's most recent building work put in place results for Auckland are similar. Building activity fell by 6.4% in 2024 compared to 2023. Residential activity fell by a significant 11.9% in 2024, while non-residential activity rose by 4.7%.

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Q1 – 2025 23RD EDITION

Other new cranes placed in Auckland included:

Aged Care
- Metlifecare Gulf Rise (Red Beach)
- Summerset Village (Half Moon Bay)
- Keith Park Retirement Village Apartments – Ryman (Hobsonville)

Civic
- WP1 Terminal Building (Mangere)

Commercial
- Building 2 Ofce (Greenlane)

Hotel
- Moxy Hotel (Central)

Notable projects that had multiple long-term cranes removed included:

- Ikea (Mt Wellington, four cranes)
- HV2 CDC Data Centre (Hobsonville, two cranes)
- The Veridian (Albany, two cranes)
- DCI Data Centre AKL02 (Rosedale, two cranes)

Q1 – 2025 23RD EDITION

Christchurch saw four index points decrease in cranes from the last index. The index value fell from 65 points to reach 61. The region currently hosts 19 cranes, down from 20.

Two long-term cranes were added to developments in Christchurch, and three were removed.

Te Kaha – Christchurch Stadium is well into the construction phase, with 10 cranes on site. The $683m project will have a seating capacity of 30,000 for sports events and a minimum of 36,000 spectators for large music events. It is currently the largest construction site in the Christchurch CBD and contains the highest number of long-term cranes in New Zealand.

CRANE ACTIVITY – CHRISTCHURCH

	OPENING COUNT	%	MOVEMENT +	-	NET Q1 2025	CLOSING COUNT	% Q3 2024
AGED CARE	0	0.0%	0	0	0	0	0.0%
CIVIC	2	10.0%	0	-1	-1	1	5.3%
CIVIL	0	0.0%	0	0	0	0	0.0%
COMMERCIAL	0	0.0%	0	0	0	0	0.0%
DATA CENTRES	0	0.0%	0	0	0	0	0.0%
EDUCATION	2	10.0%	0	0	0	2	10.5%
HEALTH	1	5.0%	0	0	0	1	5.3%
HOTEL	0	0.0%	0	0	0	0	0.0%
MIXED USE	3	15.0%	2	-2	0	3	15.8%
RECREATION	10	50.0%	0	0	0	10	52.6%
RESIDENTIAL	2	10.0%	0	0	0	2	10.5%
RETAIL	0	0.0%	0	0	0	0	0.0%
TOTAL	20	100.0%	2	-3	-1	19	100.0%

KEY SECTORS

CIVIC
EDUCATION
HEALTH
MIXED USE
RECREATION
RESIDENTIAL

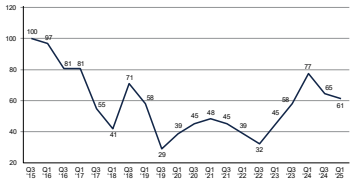
OVERALL STATUS

LEGEND

INCREASE IN NUMBER OF CRANES
DECREASE IN NUMBER OF CRANES
CRANE NUMBERS STEADY

RLB CRANE INDEX® – CHRISTCHURCH

BASE: Q3 2015 = 100



Q1 – 2025 23RD EDITION

New cranes were placed on mixed-use projects:

- Office Development at the Corner of Manchester Street and High Street
- Commercial Development at the Corner of Cambridge and Hereford Street

Cranes were removed from:

Civic

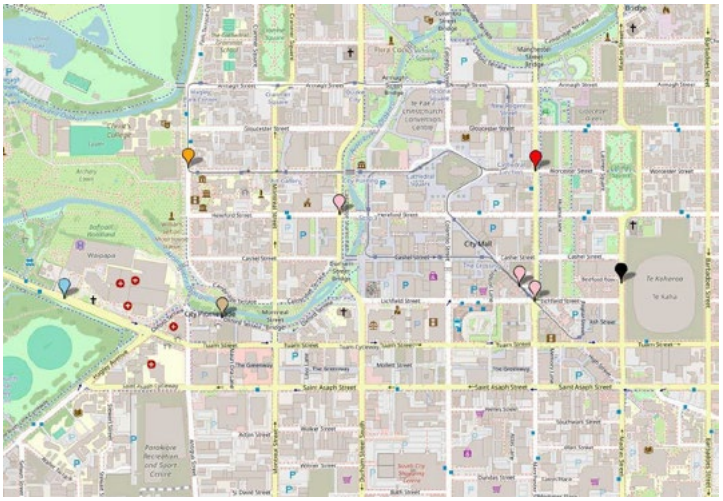
- Canterbury Museum Redevelopment

Mixed Use / Other

- Nectar 1 & 2 (two cranes)

Building activity in the Canterbury region fell by 6.4% in the twelve months of 2024 compared to 2023. The residential sector fell by 11.9% and the non-residential sector fell by 4.7%.

Canterbury's building consents for 2024 fell by 0.7% to $4.53bn. This can be almost entirely attributed to the residential sector, which saw consents fall by 7.0% for the twelve months. The non-residential sector saw a strong rise of 13.3%, mainly in the retail, office and industrial sectors.



WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Q1 – 2025 23RD EDITION

Dunedin recorded a decrease of five long-term cranes. The South Island city now hosts three long-term cranes, down from eight previously. This brings the city's Crane Index value to a 300 index points, i.e., the same index level as it was in Q1 17.

For the first half of 2024, building activity in the South Island (excluding Canterbury) rose by 3.8% compared to the same period in 2023. The residential sector rose by 0.8% and the non-residential sector rose by 9.7%.

Building consents in the South Island (excluding Canterbury) rose by 4.1% to $3.2bn in 2024. The residential sector saw consents grow by 2.0%, and the non-residential sector grew by 8.3%.

No new long-term cranes were added.

A crane was removed from

- New Dunedin Hospital – Inpatients (Dunedin Central, three cranes)
- Oracle Apartments (Roslyn)
- Otago Regional Council Ofces (Dunedin Central)

CRANE ACTIVITY – DUNEDIN

	OPENING COUNT	%	MOVEMENT +	-	NET Q1 2025	CLOSING COUNT	% Q3 2024
AGED CARE	1	12.5%	0	-1	-1	0	0.0%
CIVIC	1	12.5%	0	-1	-1	0	0.0%
CIVIL	0	0.0%	0	0	0	0	0.0%
COMMERCIAL	0	0.0%	0	0	0	0	0.0%
DATA CENTRES	0	0.0%	0	0	0	0	0.0%
EDUCATION	0	0.0%	0	0	0	0	0.0%
HEALTH	5	62.5%	0	-3	-3	2	66.7%
HOTEL	0	0.0%	0	0	0	0	0.0%
MIXED USE	1	12.5%	0	0	0	1	33.3%
RECREATION	0	0.0%	0	0	0	0	0.0%
RESIDENTIAL	0	0.0%	0	0	0	0	0.0%
RETAIL	0	0.0%	0	0	0	0	0.0%
TOTAL	8	100.0%	0	-5	-5	3	100.0%

KEY SECTORS

AGED CARE
CIVIC
HEALTH
MIXED USE

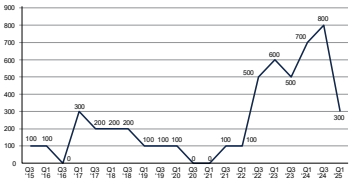
OVERALL STATUS

LEGEND

INCREASE IN NUMBER OF CRANES | DECREASE IN NUMBER OF CRANES | CRANE NUMBERS STEADY

RLB CRANE INDEX® – DUNEDIN

BASE: Q3 2015 = 100



WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Q1 – 2025 23RD EDITION

Hamilton remained stable for this edition of the RLB Crane Index®. The city continues to have two long-term cranes in its skies.

Work put in place in the Waikato region during for the first half of 2024 fell by 12.3%. Residential work was down by 6.2% and non-residential work by 22.5%.

Consents fell sharply by 17.2% in 2024. This was driven by the residential and non-residential sectors, which fell by 15.2% and 21.5%, respectively.

The Waikato Regional Theatre Project has added a crane, bringing the total number of cranes to two.

One crane has been removed from Project Kaakano on Te Ipukura Street.

CRANE ACTIVITY – HAMILTON

	OPENING COUNT	%	MOVEMENT +	-	NET Q1 2025	CLOSING COUNT	% Q3 2024
AGED CARE	0	0.0%	0	0	0	0	0.0%
CIVIC	1	50.0%	1	0	1	2	100.0%
CIVIL	0	0.0%	0	0	0	0	0.0%
COMMERCIAL	1	50.0%	0	-1	-1	0	0.0%
DATA CENTRES	0	0.0%	0	0	0	0	0.0%
EDUCATION	0	0.0%	0	0	0	0	0.0%
HEALTH	0	0.0%	0	0	0	0	0.0%
HOTEL	0	0.0%	0	0	0	0	0.0%
MIXED USE	0	0.0%	0	0	0	0	0.0%
RECREATION	0	0.0%	0	0	0	0	0.0%
RESIDENTIAL	0	0.0%	0	0	0	0	0.0%
RETAIL	0	0.0%	0	0	0	0	0.0%
TOTAL	2	100.0%	1	-1	0	2	100.0%

KEY SECTORS

CIVIC
COMMERCIAL

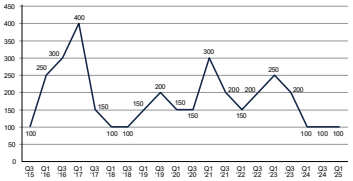
OVERALL STATUS

LEGEND

INCREASE IN NUMBER OF CRANES | DECREASE IN NUMBER OF CRANES | CRANE NUMBERS STEADY

RLB CRANE INDEX® – HAMILTON

BASE: Q3 2015 = 100



Q1 – 2025 23RD EDITION

The number of cranes operating in Queenstown was up by two from the last edition of the RLB Crane Index®. Six cranes commenced work, and four cranes were removed from projects.

The index value growth by 66 points, from 267 at Q3 2024 to 333. The region currently hosts ten cranes, up from eight in the previous edition.

For the first half of 2024, building activity in the South Island (excluding Canterbury) rose by 3.8% compared to the same period in 2023. The residential sector rose by 0.8% and the non-residential sector rose by 9.7%.

Building consents in the South Island (excluding Canterbury) rose by 4.1% to $3.2bn in 2024. The residential sector saw consents grow by 2.0%, and the non-residential sector grew by 8.3%.

The residential sector remained buoyant and the focal point of activity in the region, accounting for 90% of all long-term cranes.

CRANE ACTIVITY – QUEENSTOWN

	OPENING COUNT Q3 2024	%	MOVEMENT +	-	NET Q1 2025	CLOSING COUNT Q1 2025	%
AGED CARE	0	0.0%	0	0	0	0	0.0%
CIVIC	0	0.0%	0	0	0	0	0.0%
CIVIL	2	25.0%	0	-2	-2	0	0.0%
COMMERCIAL	2	25.0%	0	-1	-1	1	10.0%
DATA CENTRES	0	0.0%	0	0	0	0	0.0%
EDUCATION	0	0.0%	0	0	0	0	0.0%
HEALTH	0	0.0%	0	0	0	0	0.0%
HOTEL	0	0.0%	0	0	0	0	0.0%
MIXED USE	0	0.0%	0	0	0	0	0.0%
RECREATION	0	0.0%	0	0	0	0	0.0%
RESIDENTIAL	4	50.0%	6	-1	5	9	90.0%
RETAIL	0	0.0%	0	0	0	0	0.0%
TOTAL	8	100.0%	6	-4	2	10	100.0%

KEY SECTORS

CIVIL

COMMERCIAL

RESIDENTIAL

OVERALL STATUS

LEGEND

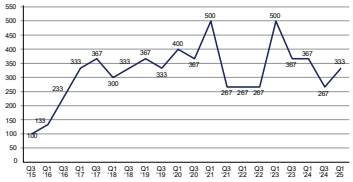
INCREASE IN NUMBER OF CRANES

DECREASE IN NUMBER OF CRANES

CRANE NUMBERS STEADY

RLB CRANE INDEX® – QUEENSTOWN

BASE: Q3 2015 = 100



Q1 – 2025 23RD EDITION

New long-term cranes were added to:

Residential
- 7 Pinnacle Place (Queenstown)
- 33 Willow Place (Kelvin Heights)
- 92 Wilding Road (Lake Hayes)
- Canyon Ridge (Arthurs Point)
- Broadview Rise (Fernhill)
- 13 Ayrburn Ridge (Millbrook)

Commercial
- 9 Brunswick Street (Queenstown)

Cranes were removed from:

Commercial
- 9 Brunswick Street (Queenstown)

Residential
- 9 Livingstone Lane (Frankton)

Civil
- 2 Shotover Delta (Frankton)
- Sugar Lane (Frankton)

Cranes remain at:

Commercial
- Brecon Street (Queenstown)

Residential
- Ploughmans Lane (Millbrook)
- Tree Tops Rise (Queenstown)
- Speargrass Flat Road (Queenstown)

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Q1 – 2025 23RD EDITION

The RLB Crane Index® decreased by 100 index points to 550 index points in Tauranga. The removal of two cranes with no additional new long-term cranes sees 11 cranes in the region.

Existing cranes remained at the Northern Quarter and Te Manawataki o Te Papa Community Hub projects.

No new long-term cranes were installed.

Two cranes were removed from the Panorama Towers and Tauranga City Council's new office building at 90 Devonport Road.

Building consents in the North Island (excluding the Auckland, Waikato, and Wellington regions) fell by 8.4%, from $4.7b in 2023 to $4.3b in 2024. The residential sector fell by 8.6%, while the non-residential sector fell by 8.1%.

Overall, building work put in place was up by 0.4% in 2024, with residential activity down 3.9% to $3.5bn and non-residential activity up by 8.0%.

CRANE ACTIVITY – TAURANGA

	OPENING COUNT	%	MOVEMENT +	-	NET	Q1 2025	CLOSING COUNT	%	Q3 2024
AGED CARE	0	0.0%	0	0	0	0	0.0%		
CIVIC	1	7.7%	0	0	0	1	9.1%		
CIVIL	7	53.8%	0	-1	-1	6	54.5%		
COMMERCIAL	4	30.8%	0	-1	-1	3	27.3%		
DATA CENTRES	0	0.0%	0	0	0	0	0.0%		
EDUCATION	0	0.0%	0	0	0	0	0.0%		
HEALTH	0	0.0%	0	0	0	0	0.0%		
HOTEL	0	0.0%	0	0	0	0	0.0%		
MIXED USE	1	7.7%	0	0	0	1	9.1%		
RECREATION	0	0.0%	0	0	0	0	0.0%		
RESIDENTIAL	0	0.0%	0	0	0	0	0.0%		
RETAIL	0	0.0%	0	0	0	0	0.0%		
TOTAL	13	100.0%	0	-2	-2	11	100.0%		

KEY SECTORS

- CIVIC
- CIVIL
- COMMERCIAL
- MIXED USE

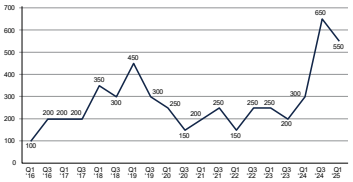
OVERALL STATUS

LEGEND

INCREASE IN NUMBER OF CRANES | DECREASE IN NUMBER OF CRANES | CRANE NUMBERS STEADY

RLB CRANE INDEX® – TAURANGA

BASE: Q1 2016 = 100



WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Q1 – 2025 23RD EDITION

Wellington's RLB Crane Index® value rose from 56 points in the last edition to 89 index points. There are now eight long-term cranes on projects in the Wellington region, up from five cranes in the previous edition of the index.

CRANE ACTIVITY – WELLINGTON

	OPENING COUNT	%	MOVEMENT +	-	NET	Q1 2025	CLOSING COUNT	%	Q3 2024
AGED CARE	0	0.0%	0	0	0	0	0.0%		
CIVIC	0	0.0%	0	0	0	0	0.0%		
CIVIL	0	0.0%	2	0	2	2	25.0%		
COMMERCIAL	3	60.0%	2	0	2	5	62.5%		
DATA CENTRES	0	0.0%	0	0	0	0	0.0%		
EDUCATION	1	20.0%	0	0	0	1	12.5%		
HEALTH	1	20.0%	0	-1	-1	0	0.0%		
HOTEL	0	0.0%	0	0	0	0	0.0%		
MIXED USE	0	0.0%	0	0	0	0	0.0%		
RECREATION	0	0.0%	0	0	0	0	0.0%		
RESIDENTIAL	0	0.0%	0	0	0	0	0.0%		
RETAIL	0	0.0%	0	0	0	0	0.0%		
TOTAL	5	100.0%	4	-1	3	8	100.0%		

KEY SECTORS

- CIVIL
- COMMERCIAL
- EDUCATION
- HEALTH

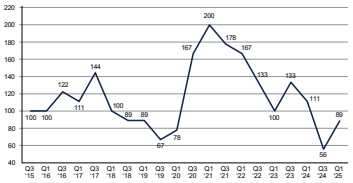
OVERALL STATUS

LEGEND

INCREASE IN NUMBER OF CRANES | DECREASE IN NUMBER OF CRANES | CRANE NUMBERS STEADY

RLB CRANE INDEX® – WELLINGTON

BASE: Q3 2015 = 100



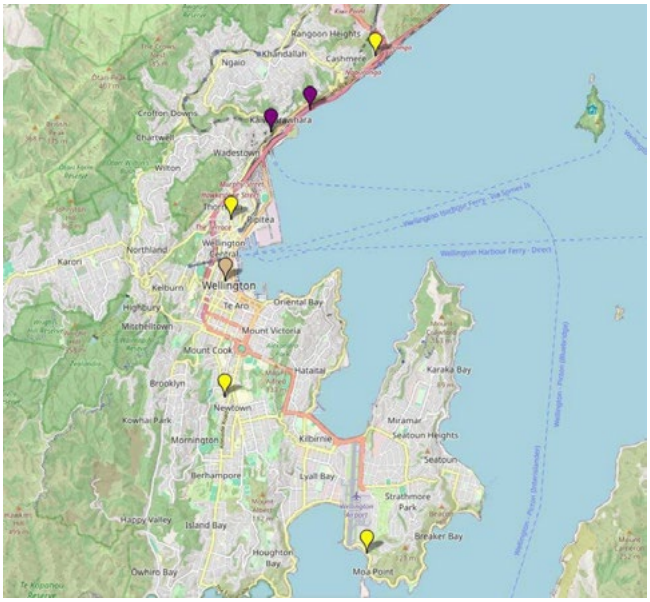
Q1 – 2025 23RD EDITION

New civil long-term cranes were placed on-site at the Wellington Waterfront and on the harbour edge remediation project, which is strengthening the existing seawall to Petone. Two commercial cranes were placed at the Parliament project and at the ESR Sequencing Lab in Kenepuru Drive.

One long-term crane was removed from Southern Cross Hospital

Overall, building work in the Wellington region decreased by 1.6% in the 2024 calendar year, falling to $1.9b. Residential activity fell by 20.5%, while non-residential activity rose by 9.5%.

Building consents also fell by 11.2% for the year. Residential consents fell by 22.7% and non-residential rose by 7.6%.



WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

Q1 – 2025 23RD EDITION

ABOUT THE RLB CRANE INDEX®

The RLB Crane Index® is published by Rider Levett Bucknall biannually in Australia, New Zealand, USA, Gulf States and Southern Africa. The New Zealand RLB Crane Index® tracks the numbers of cranes in key cities in New Zealand.

The RLB Crane Index® gives a simplified measure of the current state of the construction industry's workload in each of these locations.

Each RLB office physically counts all fixed cranes on each city's skyline twice yearly. This count provides the base information for the index. The information is then applied to a base date (fourth edition Q3 2015), which enables the RLB Crane Index® to be calculated, and highlights the relative movement of crane data over time for each city.

Subsequent movements in crane numbers are applied to the base RLB Crane Index® to highlight the crane movements in each city over time based on the relative count in Q3 2015.

Using the RLB Crane Index® table data makes for quick comparisons in determining city by city crane activity. For example, when comparing Auckland cranes for the base period of Q3 2015, against the count in Q1 2021, the following formula can be used to determine the percentage increase (or decrease):

$$\text{PERCENTAGE CHANGE} = \left[\frac{\text{CRANE INDEX}_{cp} - \text{CRANE INDEX}_{pp}}{\text{CRANE INDEX}_{pp}} \right] \times 100$$

where Crane Index$_{cp}$ is the RLB Crane Index$_{cp}$ for the current period and Crane Index$_{pp}$ is the RLB Crane Index ® for the previous period.

LOCALITY MAPS

The RLB Crane Index® locality maps offer a pictorial representation of the collected data for each city using a pin locator for the approximate location and sector of the development to where cranes are located.

The pins color indicates the market sector of the development. The pins are not an indication of the numbers of cranes in that location.

The location of the pins is indicative only and have been positioned to convey the general spread of cranes within a city and to indicate the spread of cranes within market sectors.

Locality maps have been created by RLB at GPSVisualiser.com using Leaflet and map data from OpenStreetMap.org

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RLB.com

WORKSHOP 1 | OPPORTUNITIES + CONSTRAINTS

ARCHITECTURE

WORKSHOP 1 | SITE INVESTIGATION FINDINGS: OPPORTUNITIES AND CONSTRAINTS

GRIMSHAW

CONTENT

A - Observations :
Wider Context

1. Station Context
2. Broader urban context
3. Existing urban fabric

B - Observations :
Existing building

1. Existing station plan
2. Station entrance
3. Station canopy
4. Platform
5. Station amenities
6. Station access
7. Materiality

C - Building Assessment:
Compliance & Best Practice

1. Ramps & Stairs
2. Protection from falling & Slip resistance
3. Platforms & Toilets

A - OBSERVATIONS : WIDER CONTEXT

WORKSHOP 1 | SITE INVESTIGATION FINDINGS: OPPORTUNITIES AND CONSTRAINTS

GRIMSHAW

1. STATION CONTEXT

Other stations and comparable precedents on the network

Waterloo

Woburn

Ava

Petone

Ngauranga

Wellington

2. BROADER URBAN FABRIC

Large civic buildings within the context

Hutt Hospital

Queensgate Shopping Centre

3. EXISTING URBAN FABRIC

Existing built environment : Typologies, character, materiality & scale

Trafalgar Square - Southern side of station











3. EXISTING URBAN FABRIC

Existing built environment : Typologies, character, materiality & scale

Northern side of station







B - OBSERVATIONS : EXISTING BUILDING

1. EXISTING STATION PLAN

Overview

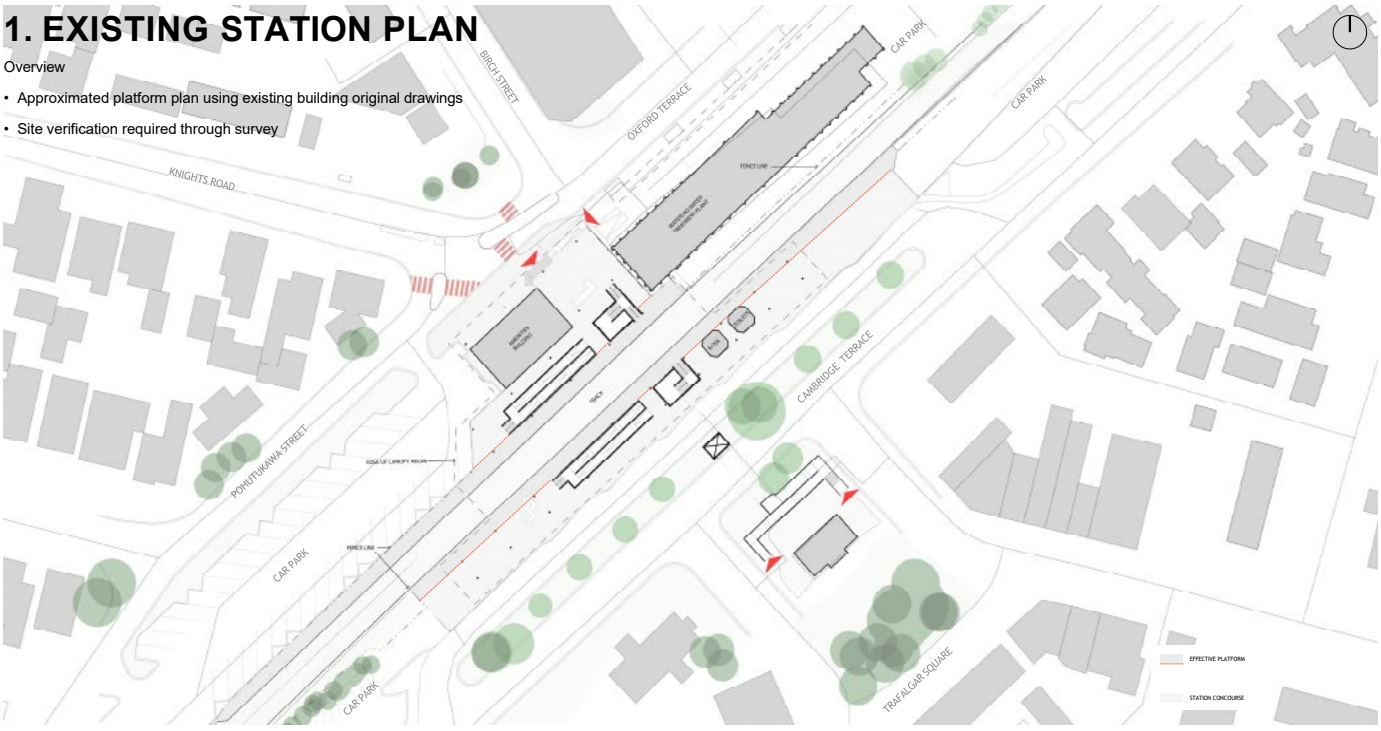
WORKSHOP 1 | SITE INVESTIGATION FINDINGS: OPPORTUNITIES AND CONSTRAINTS

GRIMSHAW

1. EXISTING STATION PLAN

Overview

- Approximated platform plan using existing building original drawings
- Site verification required through survey



2. STATION ENTRANCE

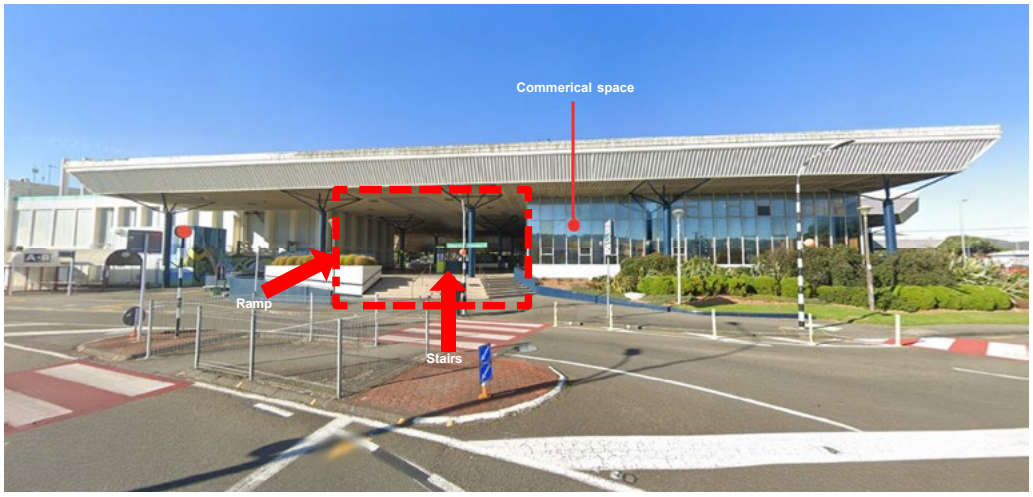
Northern side of station

OPPORTUNITIES

- Large station frontage
- Establish clear identity of station entrance

CONSTRAINTS

- Road network



2. STATION ENTRANCE

Trafalgar Square

OPPORTUNITIES

- Connection to Trafalgar place shops

CONSTRAINTS

- Road network

WORKSHOP 1 | SITE INVESTIGATION FINDINGS: OPPORTUNITIES AND CONSTRAINTS

GRIMSHAW

2. STATION ENTRANCE

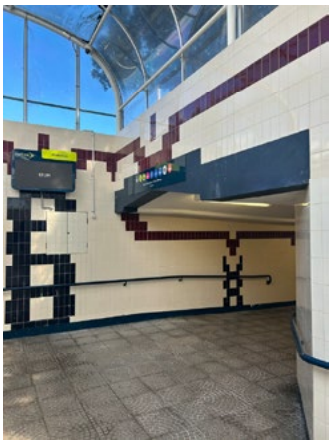
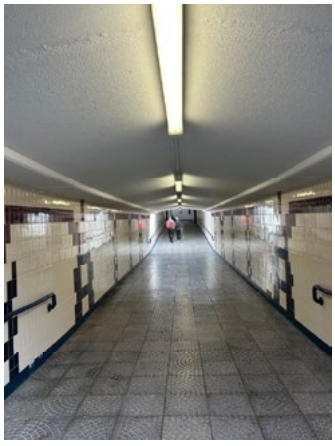
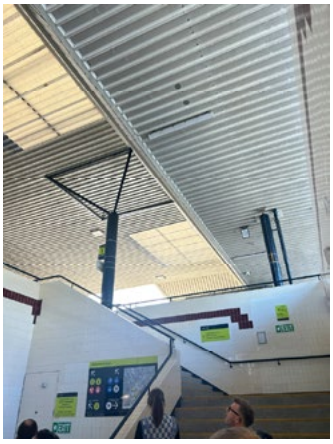
Underpass from Trafalgar Square

OPPORTUNITIES

- Connection to Trafalgar place shops
- Connection

CONSTRAINTS

- Road network
- Condition of existing underpass

WORKSHOP 1 | SITE INVESTIGATION FINDINGS: OPPORTUNITIES AND CONSTRAINTS

GRIMSHAW

2. STATION ENTRANCE

Trafalgar Square - Carpark/Bus stop

OPPORTUNITIES

- Direct connection from bus to train platform
- Clearly defined station entrance and footprint

CONSTRAINTS

- Road network
- Parking


3. STATION CANOPY

Existing canopy condition observations :

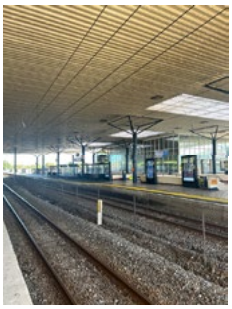
- Exposed services and patching of roof where services have been removed
- Rust, damage and aging of roof materials
- Holes evident reducing watertight capacity

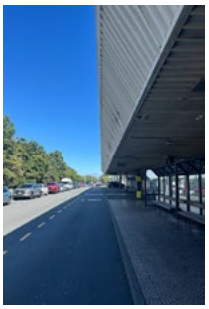
OPPORTUNITIES

- Define clear entrance point
- More efficient canopies

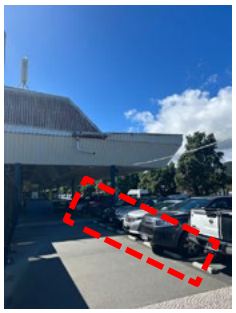
CONSTRAINTS

- Dismantling existing canopy without disrupting existing operations





4. PLATFORM



Parking on platform

Mixture of platform finishes

OPPORTUNITIES

- Clear delineation between platform and carparking
- Fencing for safety and revenue protection
- Safer and compliant platform and platform edge

CONSTRAINTS

- Current platform misalignment
- Dismantling existing platform without disrupting existing operations

5. STATION AMENITIES

Toilets

Bike storage

Secure bike cages

Bike storage

Shelters

Digital Advertising

Signage and wayfinding

Snapper card readers

OPPORTUNITIES

- Improve provision of station amenities
- Deliberate and purposeful amenities, achieve space efficiency
- Improve wayfinding
- Retail opportunities
- Consolodate bike parking across the site

CONSTRAINTS

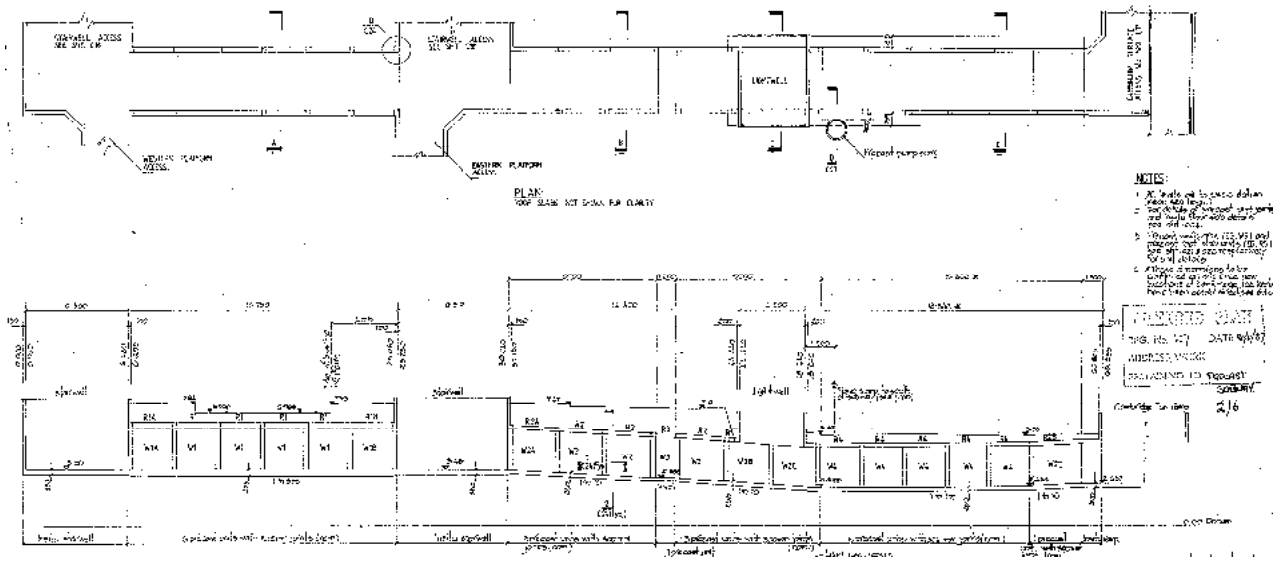
- Patronage (to support retail)

WORKSHOP 1 | SITE INVESTIGATION FINDINGS: OPPORTUNITIES AND CONSTRAINTS

GRIMSHAW

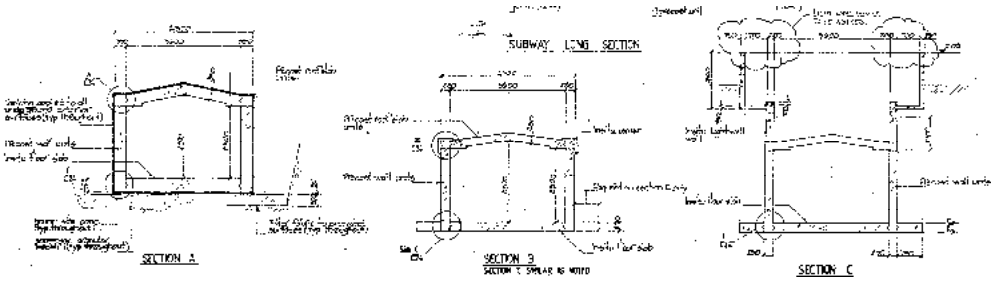
6. STATION ACCESS

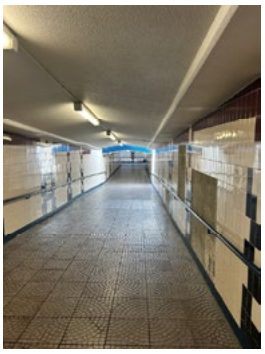
Stairs and ramps

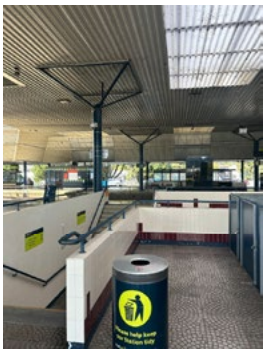


6. STATION ACCESS

Stairs and ramps







OPPORTUNITIES

- Improved accessibility
- Connectivity for people and bikes
- Improved materiality

CONSTRAINTS

- Existing condition of underpass
- CPTED

7. MATERIALITY

OPPORTUNITIES

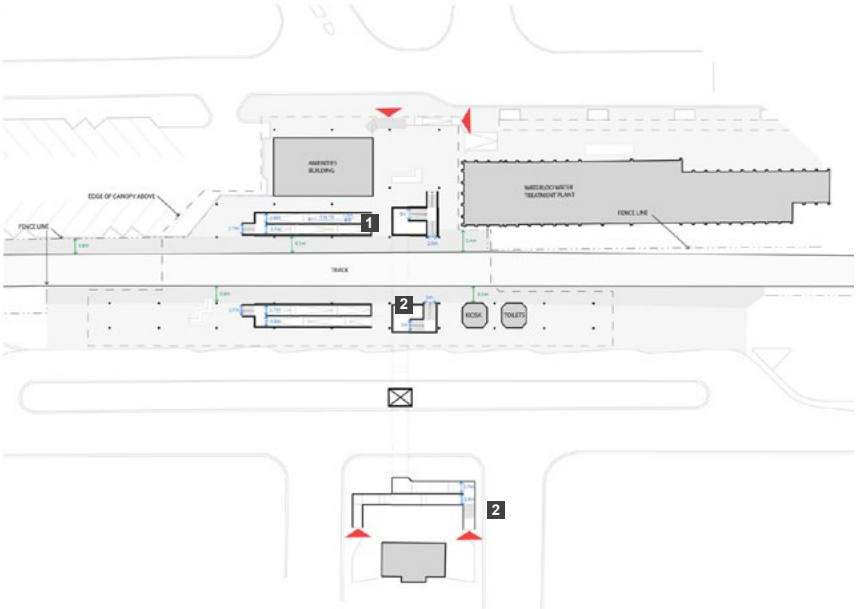
- Materiality that reflects place
- Lower maintenance materials

CONSTRAINTS

- Durability requirements
- Fire constraints

C - BUILDING ASSESMENT : COMPLIANCE & BEST PRACTICE

1. RAMPS & STAIRS



1. RAMPS

- Ramp falls are circa **1 in 10** using latest existing drawings, as built required to confirm. Not code compliant as required to be maximum 1 in 12 slope.
- Rise between landing are circa **860mm**, exceeding compliance which is maximum 750mm rise.

2. STAIRS

- All stair treads are **290mm**, not meeting minimum compliance of 300mm.
- Stair riser at Plunket room entrance exceed the maximum riser height required by code at **190mm.**
- Stair nosing edge to be rounded, existing to be reviewed

Table 3: Acceptable Ramp Slopes
Paragraph 3.1.1

Type of ramp	Maximum slope
Accessible ramp	1:12
Common ramp subject to wetting	1:10
Common ramp normally dry	1:8
Service ramps	1:3

Table 5: Landings
Paragraphs 3.3.1 and 3.3.3

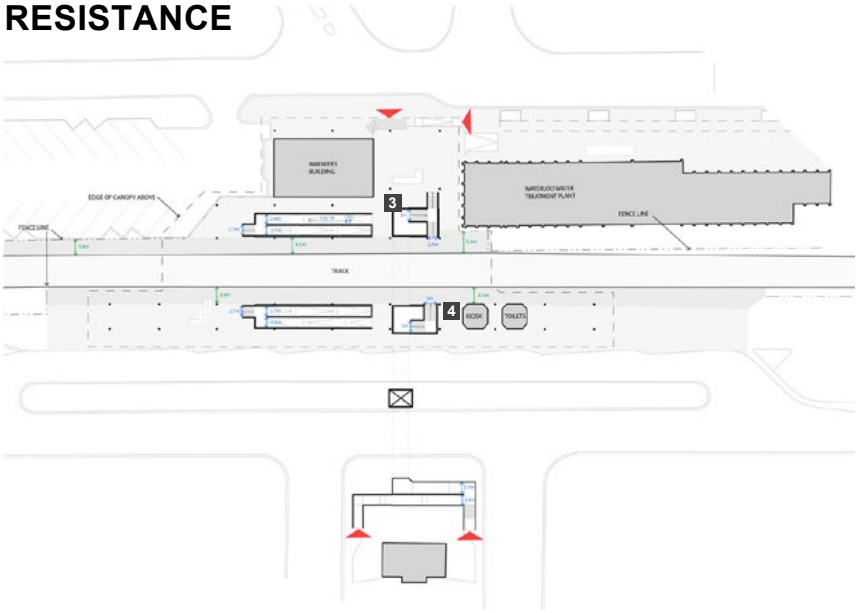
Ramp type	Maximum rise between landings (mm)	Length of landing (mm)
Accessible	750[1]	1200
Other	1500	Ramp width but need not be greater than 000

Note:
1. 750 mm is the reasonable maximum level difference for a person to negotiate in a wheelchair.

Table 6: Design Limits for Stairs
Paragraphs 4.1.1, 4.1.4 a), 4.4.2, 4.5.1 a) and Figure 17

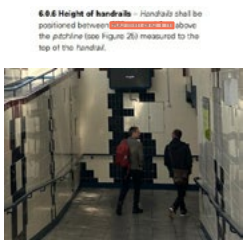
Stair	Maximum pitch	Maximum riser height (mm)	Minimum tread (mm)
Service, minor private	47°	220	220
Secondary private	41°	200	250
Common and main private	37°	190	280
Accessible	32°	180	310

2. PROTECTION FROM FALLING & SLIP RESISTANCE



3. PROTECTION FROM FALLING

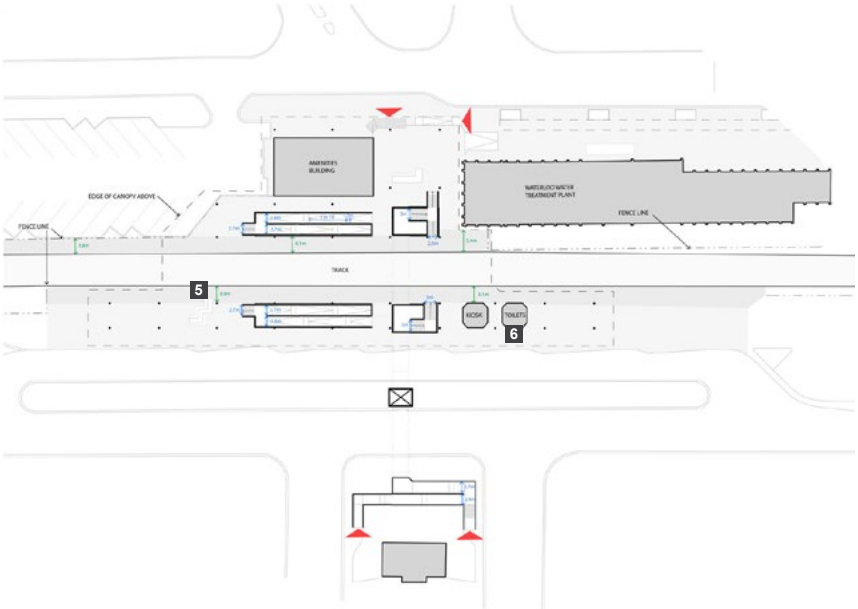
- Height of handrails and barriers at ramp and stair shafts to be site measured. Observed to be relatively low, must be between 900-1000mm to comply.
- Height of wall below handrail to be reviewed as height presents risk of being able to climb onto wall.



4. SLIP RESISTANCE

- Tile flooring presents slip risk as highlighted by current signs in station. Review of flooring both in exposed and un-exposed to weather areas around station required.

3. PLATFORMS & TOILETS

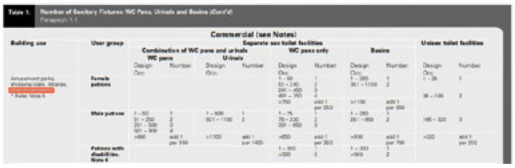


5. PLATFORMS

- Platform width best practice to be minimum 3m clear; location of platform seating for be reviewed if this sits in this zone.
- Leaking main roof required additional weather protection over seats of circa 1m from site estimates, encroaching on platform space.

6. PUBLIC TOILETS

- Toilets do not appear to have accessible design considerations.
- Passenger numbers will determine provision required and number of accessible toilets required to be compliant with code clause G1.
- No existing changing table within toilets, will be required for compliance.



APPENDIX D

BRIEF DEVELOPMENT - KEY THEMES, PRINCIPLES AND OBJECTIVES

WATERLOO STATION, FEASIBILITY STUDY AND REFERENCE DESIGN
GREATER WELLINGTON REGIONAL COUNCIL

Workshop 02 – Design Brief
DEFINING KEY OBJECTIVES, THEMES AND PRINCIPLES
16/04/2025

OUR TEAM

Greater Wellington
Te Pane Matua Taiao

aurecon

Boffa Miskell

Dunning Thornton

GRIMSHAW

RCP

RLB Rider Levett Bucknall

Tonkin+Taylor

wsp

WORKSHOP 2 | DESIGN BRIEF

AGENDA

1. Client brief - minimum requirements
2. Key Objectives, Themes and Principles
3. Station benchmarking

WORKSHOP 2 | DESIGN BRIEF

1. CLIENT BRIEF / MINIMUM REQUIREMENTS

WORKSHOP 02 | DESIGN BRIEF

CLIENT BRIEF
KEY STRATEGIC OUTCOMES

- → Maintain existing patronage and encourage increase
- → Enhanced Customer Experience –
  - → modern,
  - → safe,
  - → Intuitive wayfinding
  - → Sense of community (pride)
  - → easily navigated station,
  - → improve multimodal interchange and connectivity
- → Encourage mode shift
- → Sustainability

Key strategic outcomes are:

- To maintain, at a minimum, existing patronage levels throughout the construction and commissioning phases of the project
- To provide enhanced Customer Experience that will encourage and facilitate patronage growth including (but not limited to):
  - A fit for purpose modern public space that delivers safe, accessible and efficient intermodal integrated connectivity with the surrounding community.
  - Passive wayfinding and station identity that will provide an environment that will assist in creating a lively and well used transport hub and foster a sense of community in accordance with modern standards and construction practices.
  - Improved, multi-modal and integrated connectivity with the community – residents, businesses, employment, education, and leisure activities including the Lower Hutt Central Business District.
- To encourage and drive mode shift from private motor vehicle to active modes and public transport
- To ensure that safety, environmental, sustainability and health outcomes are realised by incorporating these in the planning and provision of our transport infrastructure

WORKSHOP 02 | DESIGN BRIEF

CLIENT BRIEF
PRINCIPLES

- → Standardised – consistent – creating brand identity
- → Meet level of service
- → CEPTED
- → Easily maintained and robust (lasting)
- → Consider safety, environment, wellbeing

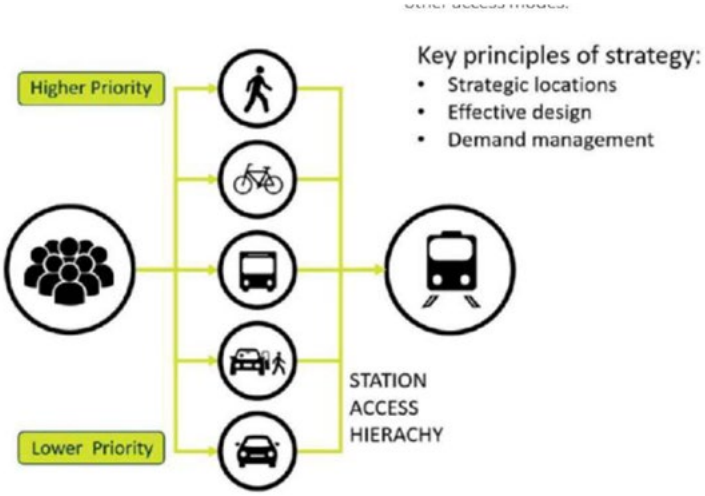
These outcomes are obtained through:

- Standardising assets, where appropriate, using universal design to ensure our assets are fit for purpose for all station users, and creating a Metlink design, look and feel to our stations where appropriate.
- Ensuring all station infrastructure assets meet our requisite levels of service, while ensuring the best value whole of lifecycle costs.
- Providing a safe environment through Crime Prevention Through Environment (CPTED) design for our station infrastructure assets
- Ensuring we can provide a clean, comfortable, and accommodating environment through regular cleaning and maintenance, and keeping our station infrastructure assets free of graffiti and vandalism
- Including safety, environmental, sustainability and health outcomes within decision making processes

WORKSHOP 02 | DESIGN BRIEF

CLIENT BRIEF
REQUIREMENTS - PERFORMANCE

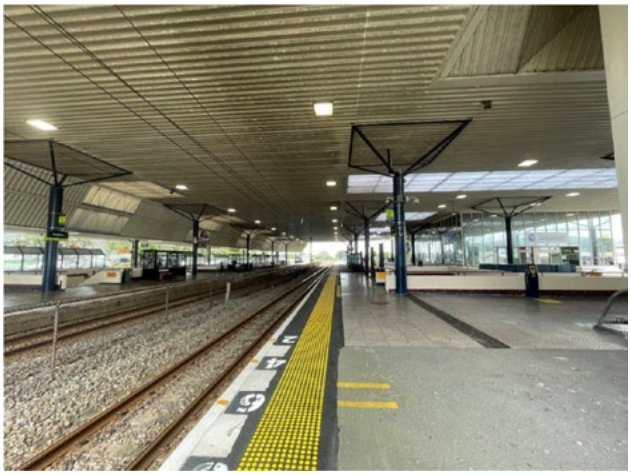
→ MAINTENANANCE (INCL MATERIALS)
→ CAPACITY AND FUTUREPROOFING REQUIREMENTS
→ INTERCHANGE ACCESS AND CONNECTIVITY



WORKSHOP 02 | DESIGN BRIEF

CLIENT BRIEF
REQUIREMENTS – SPECIFIC ELEMENTS

→ DRAINAGE
→ SOLAR PROVISIONS
→ PLATFORM
→ WAITING AREAS
→ PASSANGER AMMENITIES
→ TRAIN AND DRIVER AMMENITIES
→ TICKETING FACILITIES
→ WAYFINDING, SIGNAGE AND PASSANGER INFORMATION
→ PA SYSTEMS
→ WI FI HEARING ASSISTANCE
→ SECURITY AND CCTV
→ LIGHTING
→ SEATING
→ PLATFORM FIXTURES FITTINGS AND FURNISHINGS



WORKSHOP 02 | DESIGN BRIEF

CLIENT BRIEF
BUS INTERCHANGE

- → DESIGN REQUIREMENTS – BUS ROUTES, STAND NUMBERS, INTERCHANGE REQUIREMENTS AND GUIDELINES
- → BUS REPLACING TRAINS
- → FUTURE PROOFING
- → SHELTERS
- → DRIVERS FACILITIES
- → OPERATIONS AND MAINTENANCE
  - → DURING CONSTRUCTION

WORKSHOP 02 | DESIGN BRIEF

CLIENT BRIEF
NOMINATED SUPPLIERS

- → PROVIDERS

Table 1: GWRC Supplier Matrix

Nominated supplier	Product element/s description	Supply only	Supply and installation	Design, supply and install	Notes
Redwolf Security	Bosch CCTV equipment Data racks CCTV Cabinet PA System components - Jacques Duress point equipment			Yes	There are a variety of models that can be used from Bosch depending on the CCTV design put forward by Redwolf to suit the specific station layout.
Dzine signs	All Metlink branded signage			Yes	Once a basic station layout is designed, we can help place signs from our standard signage suite to best suit the station layout, this will include: Pole mounted station name signs Cube totem Flat panel totem Directional way finders BRT way finders Station name signs BRT LED signs are to be installed near station entrances; these require fulltime power.
Commercial signals	Led light fittings Light poles Lighting system cabling			Yes	Commercial Signals to install the lighting equipment. Their input into the lighting design, and specified component is required.
Metco	Platform shelters Wind screens Platform/shelter seats Bike parking shelters			Yes	Shelters are scalable based off a 1.2m modular design. The bicycle shelters are sized to fit come as single or double shelters fitting 16 or 32 bikes respectively.
Tilley	Bike racks:	Yes	No	No	The racks come in sets of 4, we typically order them as sets of 16 (8 up and 8 down) to fit inside the Metco cycle shelters.

Nominated supplier	Product element/s description	Supply only	Supply and installation	Design, supply and install	Notes
NEC	Real time information display: LCD screens of sizes between 26"-75"		Yes		The contact person for this is internal to GW

WORKSHOP 02 | DESIGN BRIEF

CLIENT BRIEF
REFERENCES

→ STANDARDS
→ GUIDELINES
→ PLANS

Standards, Guidelines and Plans

Title	Date	Author	Link	Status
Building Act 2004	August 2004	Ministry of Economic Development and the Building Industry Authority	Building Act 2004 No 72 (as at 23 December 2023), Public Act Contents – New Zealand Legislation	Available
Ticketing facility guideline		GWRC	Under development	Under Development
GWRC General Finishes Schedule		GWRC	Under development	Under Development
Metlink Wayfinding & Signage Guidance		GWRC	Under development	Under Development
Wellington Regional Public Transport Plan 2021 -2031	June 2021	GWRC	Wellington Regional Public Transport Plan 2021-2031	Available
GWRC Handrail Detail Sheets 1 and 2 (Dwg 901 Rev A and 902 Rev A)	September 2021	GWRC	A07.20 GWRC Handrail Detail.pdf (sharepoint.com)	Available
GWRC Rail Lighting Standard	August 2023	GWRC	Metlink Rail - Lighting Standard 2023.pdf	Available
Metlink Brand Guidelines	August 2024	GWRC	Communications - Metlink Brand Guidelines.pdf - Folder View	Available
Guidelines for public transport infrastructure and facilities: interim consultation draft	April 2014	Waka Kotahi NZ Transport Agency	Guidelines for public transport infrastructure and facilities: interim consultation draft (nzta.govt.nz)	Available
Wellington Regional Mode Shift Plan	September 2020	Waka Kotahi NZ Transport Agency	Regional mode shift plan – Wellington	Available
Note: KiwiRail is responsible for all relevant rail-related standards, but these are some we are aware of.				
Rail Operations Interoperability (NRSS 7)	June 2007	KiwiRail	NRSS-7-Rail-Operations-Interoperability-Issue-2-Effective-Date-11-06-2007.pdf	Available
Engineering Interoperability Standards (NRSS 6)	April 2013	KiwiRail	NRSS-6-Engineering-Interoperability-Standards-Issue-4-Effective-Date-19-04-2013.pdf	Under Review to be replaced by M-ST-NS-8101 Rail Vehicle Interoperability
Civil Engineering Standard Passenger Platforms (C-ST-PL-4109)	February 2018	KiwiRail	Rail Assets and Infrastructure - Stations and Related - C-ST-PL-4109 Passenger Platforms.pdf - Folder View	Available
Track Standard Clearances (T-ST-DE5212)	August 2023	KiwiRail	Clearances	Available

WORKSHOP 2 | DESIGN BRIEF

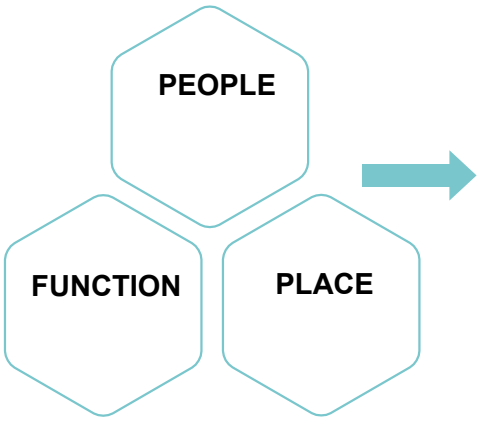
2. KEY OBJECTIVES, THEMES AND PRINCIPLE

WORKSHOP 2 | DESIGN BRIEF

TRANSPORT

WORKSHOP 02 | DESIGN BRIEF

THE VISION / BRIEF KEY OBJECTIVES, THEMES AND PRINCIPLES **TRANSPORT**



OBJECTIVES (WHY)

IDENTIFY KEY DRIVERS FROM THE CLIENT BRIEF

- → To deliver a seamless interchange experience to drive growth in public transport patronage
- → To improve travel choice and access to key economic and social destinations for the communities of Lower Hutt
- → To enable transit oriented development in the Waterloo area, to enhance connectivity and reduce car dependency

THEMES

- → **Mode shift:** Design must promote transition from cars to active/public transport (station access hierarchy).
- → **Enhanced customer experience:** Safe, modern, efficient and inclusive public space – delight!
- → **Integrated connectivity:** Seamless safe links between bus, train, walking, cycling, micromobility, and surrounding community
- → **Future-proofing & Flexibility:** Capacity for increased patronage, electric buses, on-demand services and network changes.
- →

PRINCIPLES

(outcomes – critical success factor)

- → Safe & Inclusive
- → Minimised Travel Time
- → Ease of Accessibility
- → Clarity
- → Customer Experience
- → Functional & Operable
- → Future-proofed

WORKSHOP 02 | DESIGN BRIEF

FUNCTIONAL & OPERATIONAL REQUIREMENTS
PATRONAGE FORCASTS & STATION SIZING

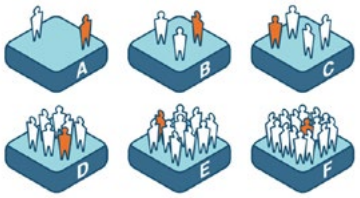
- → Growth varies between inbound and outbound flows and also by HVL and WRL services. In general, the growth from 2018 to 2053 is 140%
- → Station capacity assessments to inform sizing requirements are based on forecast passenger demand for a defined time period in the future (in this case 2053)
- → Based on busiest 15-minute boarding/alighting period (AM Peak data included here)
- → The total forecast number of entering and exiting passengers are factored up by 25% to allow for train service disruption.
- → Static modelling is underway and is due to report on 22 April.

2053

Line	Segment	Volume	Board	Alight	veh/2hr
HVLI01	30012-30013	3365	682	165	8
HVLI02	30012-30013	1642	813	72	8
HVLO01	30012-30011	72	22	143	8
HVLO02	30012-30011	125	56	72	8
WRLI01	30012-30013	2598	515	144	4
WRLO01	30012-30011	155	110	11	2
			2198	**607**	

2018 to 2053

Line	Segment	Volume	Board	Alight	
HVLI	30012-30	124%	131%	145%	
HVLO	30012-30	136%	144%	413%	
WRLI01	30012-30	138%	124%	114%	
WRLO01	30012-30	277%	379%	79%	
Overall					140%



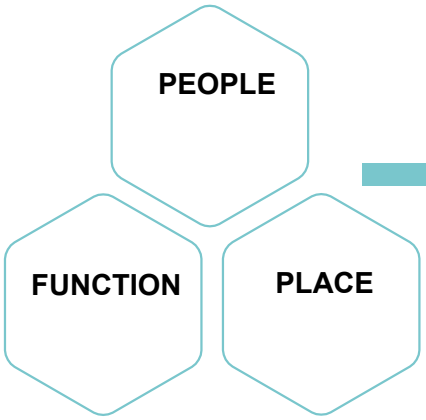
FUTUREPROOFING
Wellington's Transport Analytics Unit is working with our team to forecast passenger demand across both bus and rail. Sensitivity tests will be applied, including a higher housing growth scenario to take account of the changes in the District Plan and other planned investment that is likely to enable more growth

WORKSHOP 2 | DESIGN BRIEF

URBAN + LANDSCAPE

WORKSHOP 02 | DESIGN BRIEF

THE VISION / BRIEF KEY OBJECTIVES, THEMES AND PRINCIPLES



OBJECTIVES (WHY)

- A fit for purpose modern public space that delivers **safe**, **accessible** and efficient intermodal **integrated connectivity with the surrounding community**
- Passive wayfinding and station **identity** that will provide an environment that will assist in **creating a lively and well used transport hub** and foster a **sense of community** in accordance with modern standards and construction practices.
- Improved **multi-modal and integrated community** – residents, businesses, employment, education, and leisure activities including the Lower Hutt Central Business District.

THEMES

CUSTOMER EXPERIENCE THAT IS:

- → COMMUNITY FORMING
- → PROVIDES CONNECTIONS –PHYSICALLY, VISUALLY AND COMMERCIALLY (SUPPORTS LOCAL AND WIDER BUSINESSES)
- → SUPPORTS MULTI-MODAL OPTIONS

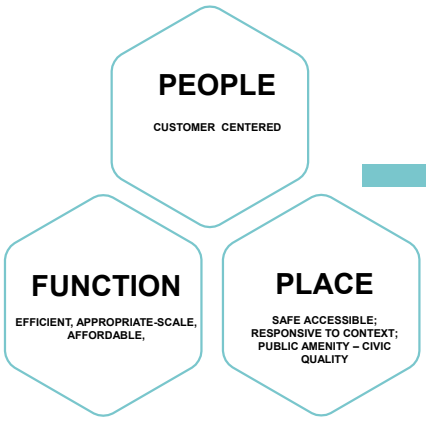
PRINCIPLES

(outcomes – critical success factor)

- → REINSTATE THE "GREEN" AND CULTURAL IDENTITY TO THE WATERLOO PRECINCT
- → REGULARISE THE "HUM"
- → PROVIDE SPACE TO ATTRACT (FUTURE) COMMERCIAL INVESTMENT
- → SUPPORT HARMONIOUS CONNECTIONS
  - → VISUAL
  - → PHYSICAL
  - → COMMERCIAL
- → MAKE IT GREAT FOR EVERYONE
- → RESPOND TO THE DIFFERENT EAST/WEST CONTEXTS (IMMEDIATE VILLAGE / HUTT CITY CONNECTOR)

WORKSHOP 02 | DESIGN BRIEF

THE VISION / BRIEF KEY OBJECTIVES, THEMES AND PRINCIPLES



OBJECTIVES (WHY)

IDENTIFY KEY DRIVERS FROM THE CLIENT BRIEF

DRAFT

THEMES

- → CUSTOMER CENTERED - INTUITIVE WYFINDING,
- → EASY AND SAFE CUSTOMER EXPERIENCE
- → PUBLIC AMENITY / CONNECTOR / CIVIC QUALITY
- → CONSTRAINTS
- → PERFORMANTIVE & EFFICIENT
- → APPROPRIATE-SCALE,
- → AFFORDABLE,
- → FUTUREPROOFED,
- → PART OF INTEGRATED TRANSPORT SYSTEM,
- → CATALYST FOR POSITIVE CHANGE (ENABLING TOD),
- → SAFE ACCESSIBLE;
- → RESPONSIVE TO DISTINCT CONTEXT
- → LEGACY AND BENCHMARK FOR TOD
- → UNIQUE / CONNECTED TO LANDSCAPE
- →

PRINCIPLES

(outcomes – critical success factor)

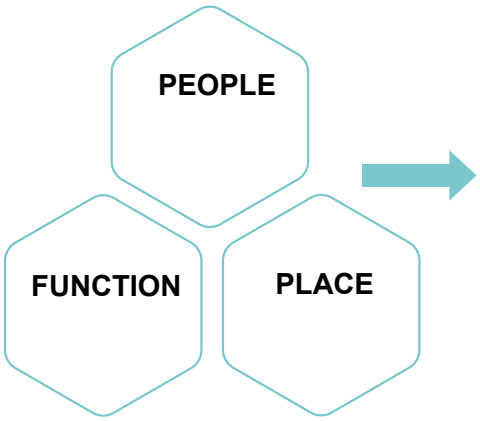
- → CUSTOMER EXPERIENCE,
- → AFFORDABILITY,
- → RESILIENCE,
- → FLEXIBILITY,
- → SAFETY,
- → SUSTAINABILITY,
- → DELIVERABILITY

WORKSHOP 2 | DESIGN BRIEF

CIVILS

WORKSHOP 02 | DESIGN BRIEF

THE VISION / BRIEF KEY OBJECTIVES, THEMES AND PRINCIPLES **CIVIL**



OBJECTIVES (WHY)

IDENTIFY KEY DRIVERS FROM THE CLIENT BRIEF

- → Level of service (e.g minimise impact of stormwater runoff, avoid ponding etc.) to be considered in conjunction with lifecycle costs
- → Ease of maintenance and accessibility
- → Repurpose existing infrastructure
- → Flexibility & future proofing
- → Safety & Accessibility (e.g drain grates)
- → Sustainability

THEMES

- → Level of service in line with current standards
- → Maintenance and accessibility considerations captured with infrastructure designs
- → Water sensitive urban design to be incorporated in line with current standards and best practice
- → Reuse of civil infrastructure where possible
- → Avoid disturbance of key infrastructure in and around the site
- → Where practicable provide allowance for future proofing
- → Safety in design

PRINCIPLES

(outcomes – critical success factor)

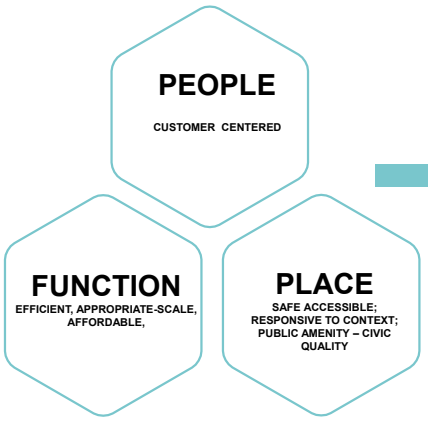
- → Affordability,
- → Resilience,
- → Flexibility,
- → Safety,
- → Sustainability,
- → Deliverability

WORKSHOP 2 | DESIGN BRIEF

STRUCTURE + GEOTECH

WORKSHOP 02 | DESIGN BRIEF

THE VISION / BRIEF
KEY THEMES AND PRINCIPLES



Objective	Themes	Principles

Protect Aquifer	Limit foundation incursion through deep layers	• Limit foundation demands
		• Limit weight (structural & other)
		  • Materiality
		  • Height/number of stories
		• Limit bracing demands
		  • More, smalling bracing elements rather than fewer, larger (so loads are not concentrated)

Limit overbuild over existing services	• Maintain future access • Foundation constraints, ie can't pile through/near existing services	• Drives structural form/solutions • Influences building envelope/extent
Constructability	• Live Rail Site • Wellington Water Access	• Consider placement of structure wrt existing • Consider sequence of demolition vs re-built vs temporary condition (shorter temp platforms/ relocated platforms/station • Stay cognisant of exclusion zones
Wind Mitigation	• Horizontal weather protection vs Vertical weather protection • Less roof area = less total wind force resisted by foundations	• Consider opportunities for offset wind barriers at person height scale (a la Grande Arche) • Investigate architectural precedence for stations in poor climates
Cross Rail Structure	• Subway or Bridge	• Investigate seismic performance of subway under liquefaction • Option for bridging tracks?
Consider Sustainability/ Reuse		• Explore reuse of existing foundations in some options • Materiality choices (limit concrete/ promote timber etc) • Upfront vs life cycle carbon (structure vs servicing)
Ascertain Importance Level		• "Bottom up approach" • Ascertain liquefaction trigger level and use this to inform target importance level/ achievable demands • Functionality of rail vs platform
Futureproofing	Seismic Loading 1170.5/NSHM	• Design to good principals and load level becomes less important
	Durability/ Maintenance	• Limit uninspectable/ unreachable areas • Materiality choices
	Wellington Water Future	• Don't obstruct future strengthening/construction routes for this building (ie don't island)
Limit Soil Movement offsite	Limit amount of historic (likely) contaminated soil needing disposal	• Consider some options which limit bulk change in levels

WORKSHOP 02 | DESIGN BRIEF

THE VISION / BRIEF
KEY THEMES AND PRINCIPLES

Objective	Themes	Principles	Success/ Elevation Criteria

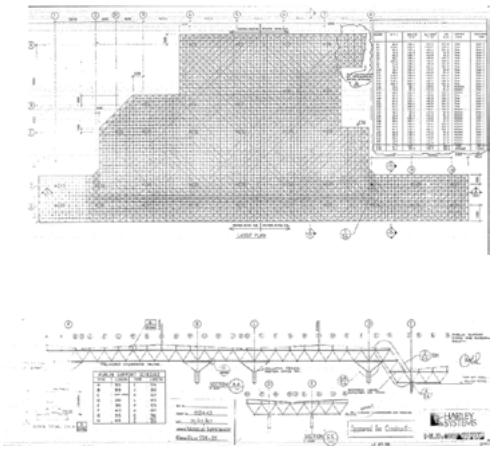
Protect Aquifer	Limit foundation incursion through deep layers	• Limit foundation demands
		• Limit weight (structural & other)
		  • Materiality
		  • Height/number of stories
		• Limit bracing demands
		  • More, smalling bracing elements rather than fewer, larger (so loads are not concentrated)
			• We can qualitatively rank options as to likely foundation demands and potential for founding in upper layers

Limit overbuild over existing services	• Maintain future access
	• Foundation constraints, ie can't pile through/near existing services
		• Drives structural form/solutions
		• Influences building envelope/extent
			• Options can be scored as to impact on existing services
			  • Plan areas influence
			  • Construction restrictions

Constructability	• Live Rail Site • Wellington Water Access	• Consider placement of structure wrt existing • Consider sequence of demolition vs re-built vs temporary condition (shorter temp platforms/ relocated platforms/station) • Stay cognisant of exclusion zones	• Rank options from easiest (new station away from existing) → hardest (replace on existing footprint whilst in service) • Rank foundation vibration likelihood close to existing assets.
Wind Mitigation	• Horizontal weather protection vs Vertical weather protection • Less roof area = less total wind force resisted by foundations	• Consider opportunities for offset wind barriers at person height scale (a la Grande Arche)	• Wind consultant could be employed to qualitatively evaluate options, (Mike Donn, VUW) • Tension between people flow and wind flow (direct lines)
Across Rail Structure	• Subway or Bridge	• Investigate seismic performance of subway under liquefaction • Options for bridging tracks/road?	• Likely cost vs unknown risk matrix for each option
Consider Sustainability/ Reuse		• Explore reuse of existing foundations in some options • Materiality choices (limit concrete/ promote timber etc) • Upfront vs life cycle carbon (structure vs servicing)	• Qualitatively rank options regarding most upfront carbon to least (very crude at this stage) which can be considered against in service options.
Ascertain Importance Level		• "Bottom up approach" • Ascertain liquefaction trigger level and use this to inform target importance level/ achievable demands • Functionality of rail vs platform	• Relatively agnostic re options, requires holistic thinking of earthquake/ storm scenarios in relation to different options. • Life safety vs local damage
Futureproofing	Seismic Loading 1170.5/NSHM	• Design to good principals and load level becomes less important	• Future stage consideration (provided scale of option)
	Durability/ Maintenance	• Limit uninspectable/ unreachable areas • Materiality choices	• Quantitively group options into ongoing durability/maintenance requirements
	Wellington Water Future	• Don't obstruct future strengthening/construction routes for this building (ie don't island)	• Rank options re interface with Wellington Water site.
Limit Soil Movement offsite	Limit amount of historic (likely) contaminated soil needing disposal	• Consider some options which limit bulk change in levels	• Quantitively group into "high, medium, low" etc likelihood of large scale offsite disposal required.

WORKSHOP 02 | DESIGN BRIEF

Wind Mitigation
Tunnel Concept



WORKSHOP 02 | DESIGN BRIEF

THE VISION / BRIEF
KEY THEMES AND PRINCIPLES

Objective	Themes	Principles	Success/ Elevation Criteria

Protect Aquifer
Deliverability
	Limit foundation incursion through deep layers	• Limit foundation demands
		• Limit weight (structural & other)
		  • Materiality
		  • Height/number of stories
		• Limit bracing demands
		  • More, smalling bracing elements rather than fewer, larger (so loads are not concentrated)
			• We can qualitatively rank options as to likely foundation demands and potential for founding in upper layers

Limit overbuild over existing services
Deliverability
	• Maintain future access
	• Foundation constraints, ie can't pile through/near existing services
		• Drives structural form/solutions
		• Influences building envelope/extent
			• Options can be scored as to impact on existing services
			  • Plan areas influence
			  • Construction restrictions

Constructability Affordability/Deliverability	• Live Rail Site • Wellington Water Access	• Consider placement of structure wrt existing • Consider sequence of demolition vs re-built vs temporary condition (shorter temp platforms/ relocated platforms/station) • Stay cognisant of exclusion zones	• Rank options from easiest (new station away from existing) → hardest (replace on existing footprint whilst in service) • Rank foundation vibration likelihood close to existing assets.
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Across Rail Structure Affordability/Deliverability/ Customer Experience	• Subway or Bridge	• Investigate seismic performance of subway under liquefaction • Options for bridging tracks/road?	• Likely cost vs unknown risk matrix for each option
Consider Sustainability/ Reuse Sustainability		• Explore reuse of existing foundations in some options • Materiality choices (limit concrete/ promote timber etc) • Upfront vs life cycle carbon (structure vs servicing)	• Qualitatively rank options regarding most upfront carbon to least (very crude at this stage) which can be considered against in service options.
Ascertain Importance Level Affordability/Deliverability/ Flexibility		• "Bottom up approach" • Ascertain liquefaction trigger level and use this to inform target importance level/ achievable demands • Functionality of rail vs platform	• Relatively agnostic re options, requires holistic thinking of earthquake/ storm scenarios in relation to different options. • Life safety vs local damage
Futureproofing Flexibility	Seismic Loading 1170.5/NSHM	• Design to good principals and load level becomes less important	• Future stage consideration (provided scale of option)
	Durability/ Maintenance	• Limit uninspectable/ unreachable areas • Materiality choices	• Quantitively group options into ongoing durability/maintenance requirements
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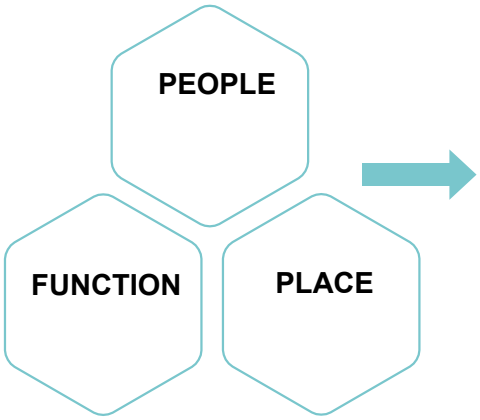
Limit Soil Movement offsite Affordability/Deliverability	Limit amount of historic (likely) contaminated soil needing disposal	• Consider some options which limit bulk change in levels	• Quantitively group into "high, medium, low" etc likelihood of large scale offsite disposal required.

BUILDING SERVICES

WORKSHOP 02 | DESIGN BRIEF

THE VISION / BRIEF KEY OBJECTIVES, THEMES AND PRINCIPLES **BUILDING SERVICES**



OBJECTIVES (WHY)

IDENTIFY KEY DRIVERS FROM THE CLIENT BRIEF

- → Utilise PV panels for power generation,
- → Provide comfortable enclosed waiting areas environments
- → Accessible design principles which may includes lifts and hearing-assistance system,
- → Clear and uniform announcement systems,
- → Station design facilitates future development. ie electric bus charging & along side TOD,
- → Energy efficient building services,
- → Safe environment for station users and their belongings (i.e bicycles),

THEMES

- → Environmentally sustainable design practices used across the station development,
- → Designed for easy maintenance of services,
- → An accessible station for people to enjoy,
- → Building Services to enhance user experience,
- → Functional services design,
- → Design for public use utilising tamper proof philosophies,
- → Utilise new technologies where possible,
- → Staging through construction,

PRINCIPLES

(outcomes – critical success factor)

- → Longevity and resiliency,
- → Customer Experience,
- → Affordability,
- → Maintainability,
- → Safety,
- → Sustainability,
- → Buildability,
- → Functionality,

ARCHITECTURE

WORKSHOP 02 | DESIGN BRIEF

OBJECTIVES
IMPROVING CUSTOMER EXPERIENCE – CREATING A BENCHMARK

1. Customer centric civic design that enhances everyday life and promotes good access, mobility and design excellence;
appropriate scale, efficient layout, intuitive wayfinding and connection to place
CSLER, NSW

2. Clear, safe and convenient station address and access promotes public transport use whilst ensuring a coherent brand and identification
Ringwood Station, Melbourne, VIC

3. Intuitive and clutter free environments encourage safe access, wayfinding and ease of navigation; creating stress free and legible travel experience Grade Separation Project, Victoria, AUS

WORKSHOP 02 | DESIGN BRIEF

OBJECTIVES
FUNCTIONAL, EFFICIENT, AFFORDABLE AND FLEXIBLE STATIONS

1. Maximise opportunity for repetition and prefabrication and off-site manufacturing for controlled quality
Nunnawading, VIC

2. Reduce building scale and massing, priritise on customer comfort; Rationalise structure to reduce material usage; prefabrication of elements for minimising construction waste
Mitcham, VIC

3. Reduce operational cost by building appropriate day 1 provision and safeguard for growing communities
Mernda, VIC

WORKSHOP 02 | DESIGN BRIEF

OBJECTIVES
RELATIONSHIP TO LANDSCAPE

1. Access to station integrated with landscape, connection to place
Mernda, VIC

2. Creating quality public realm for community - precinct landscape is delivered in a considered way and incorporated into the station architecture;
Gardiner, VIC

3. Integrating station services into the landscape to complement greening and restorative initiatives, wetlands
Prince Alfred Pool and Park, NSW

WORKSHOP 02 | DESIGN BRIEF

PEOPLE
CUSTOMER CENTRED DESIGN EXAMPLES

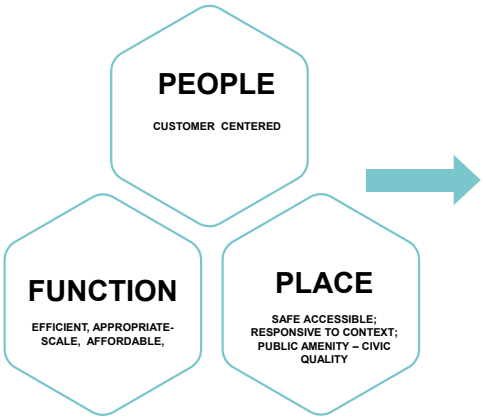
→ Clear circulation, spatial planning, way-finding, connectivity to precinct
→ Weather protection
→ Comfort.
→ Security.
→ Connection to nature (landscape)
→ Being part of fully integrated transport system

THE SYDNEY METRO PRODUCT

Sydney Metro Customer Satisfaction Service Drivers diagram

WORKSHOP 02 | DESIGN BRIEF

THE VISION / BRIEF KEY OBJECTIVES, THEMES AND PRINCIPLES



OBJECTIVES (WHY)

IDENTIFY KEY DRIVERS FROM THE CLIENT BRIEF

THEMES

- → CUSTOMER CENTERED - INTUITIVE WYFINDING,
- → INTERGRATED TRANSPORT HUB
- → EASY AND SAFE CUSTOMER EXPERIENCE
- → PUBLIC AMENITY / CONNECTOR /
- → CIVIC QUALITY
- → CONSTRAINTS

- → PERFORMANTIVE & EFFICIENT
- → APPROPRIATE-SCALE,
- → AFFORDABLE,
- → FUTUREPROOFED,
- → PART OF INTEGRATED TRANSPORT SYSTEM,
- → CATALYST FOR POSITIVE CHANGE (ENABLING TOD),
- → SAFE ACCESSIBLE;
- → RESPONSIVE TO DISTINCT CONTEXT
- → LEGACY AND BENCHMARK FOR TOD

- → UNIQUE / CONNECTED TO LANDSCAPE

- →

PRINCIPLES

(outcomes – critical success factor)

- → CUSTOMER EXPERIENCE,
- → AFFORDABILITY,
- → RESILIENCE,
- → FLEXIBILITY,
- → SAFETY,
- → SUSTAINABILITY,
- → DELIVERABILITY

APPENDIX E
BENCHMARKING PRESENTATION

WATERLOO STATION, FEASIBILITY STUDY AND REFERENCE DESIGN
GREATER WELLINGTON REGIONAL COUNCIL

Workshop 02 – STATION BENCHMARKING
16/04/2025

OUR TEAM

Greater Wellington
Te Pane Matua Taiao

aurecon

Boffa Miskell

Dunning Thornton

GRIMSHAW

RCP

RLB Rider Levett Bucknall

Tonkin+Taylor

wsp

WORKSHOP 2 | STATION BENCHMARKING

CONTEXT

WORKSHOP 02 | STATION BENCHMARKING

OBJECTIVES
IMPROVING CUSTOMER EXPERIENCE – CREATING A BENCHMARK

1. Customer centric civic design that enhances everyday life and promotes good access, mobility and design excellence;
appropriate scale, efficient layout, intuitive wayfinding and connection to place
CSLER, NSW

2. Clear, safe and convenient station address and access promotes public transport use whilst ensuring a coherent brand and identification
Ringwood Station, Melbourne, VIC

3. Intuitive and clutter free environments encourage safe access, wayfinding and ease of navigation; creating stress free and legible travel experience Grade Separation Project, Victoria, AUS

WORKSHOP 02 | STATION BENCHMARKING

OBJECTIVES
FUNCTIONAL, EFFICIENT, AFFORDABLE AND FLEXIBLE STATIONS

1. Maximise opportunity for repetition and prefabrication and off-site manufacturing for controlled quality
Nunnawading, VIC

2. Reduce building scale and massing, priritise on customer comfort; Rationalise structure to reduce material usage; prefabrication of elements for minimising construction waste
Mitcham, VIC

3. Reduce operational cost by building appropriate day 1 provision and safeguard for growing communities
Mernda, VIC

WORKSHOP 02 | STATION BENCHMARKING

OBJECTIVES
RELATIONSHIP TO LANDSCAPE

1. Access to station integrated with landscape, connection to place
Mernda, VIC

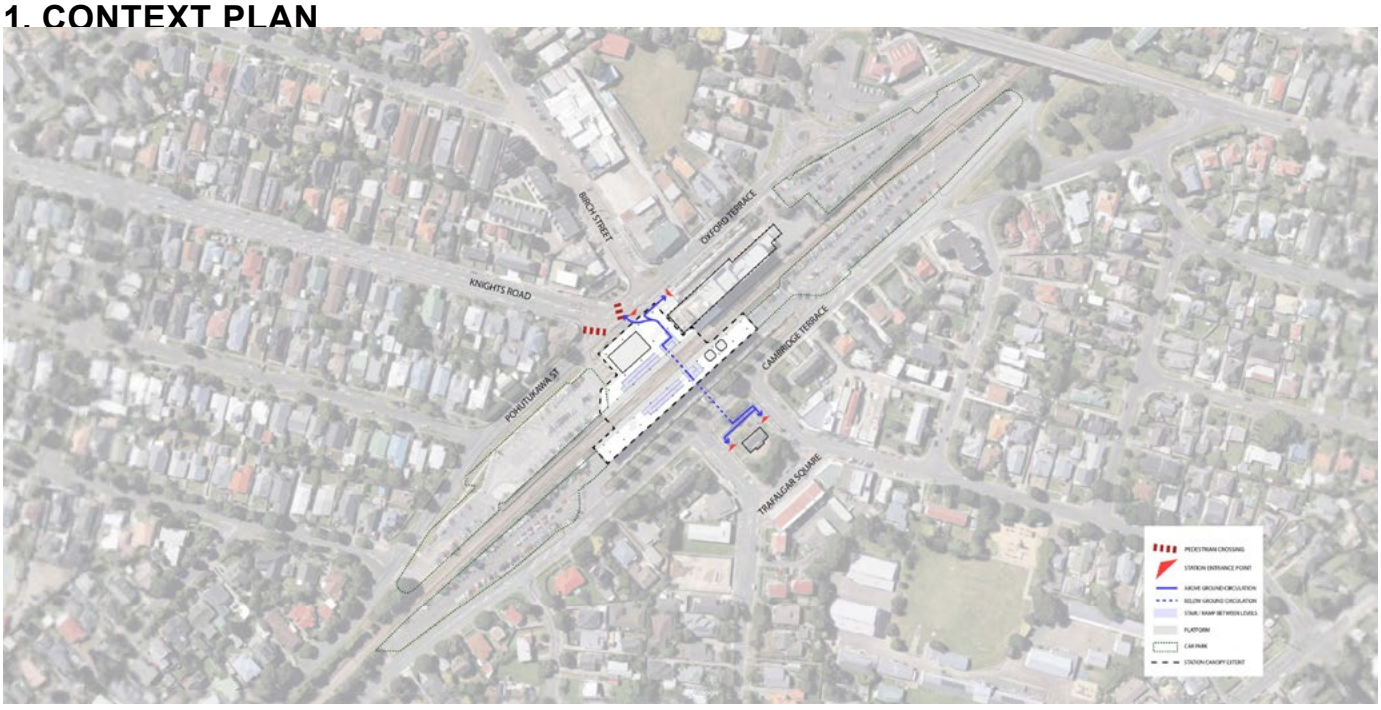
2. Creating quality public realm for community - precinct landscape is delivered in a considered way and incorporated into the station architecture;
Gardiner, VIC

3. Integrating station services into the landscape to complement greening and restorative initiatives, wetlands
Prince Alfred Pool and Park, NSW

WORKSHOP 2 | STATION BENCHMARKING

2. STATION BENCHMARKING

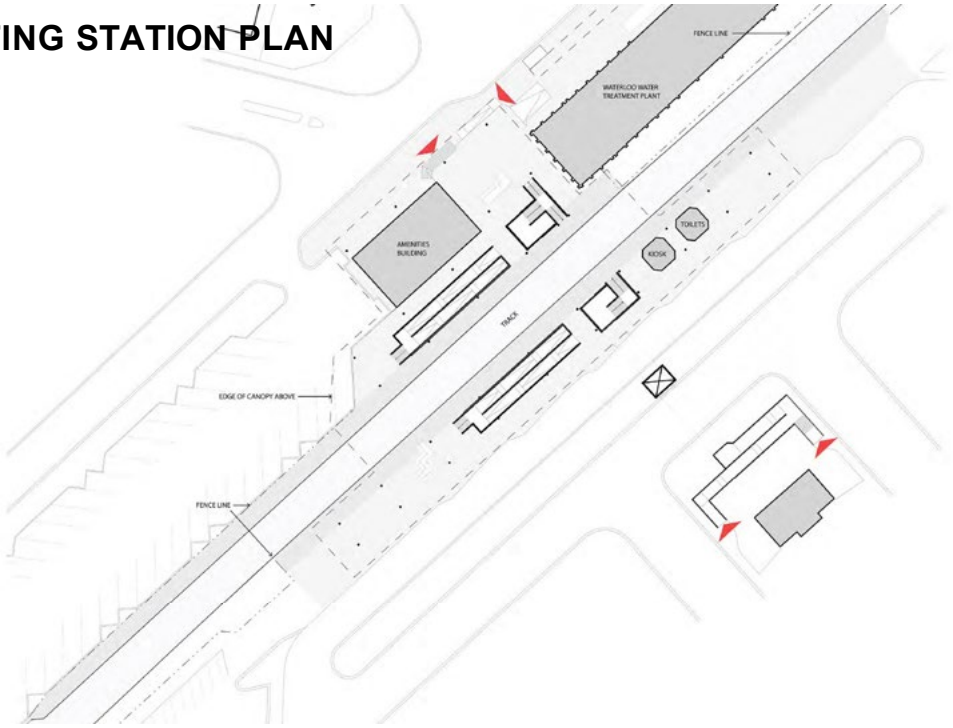
1. CONTEXT PLAN



WORKSHOP 02 | STATION BENCHMARKING

GRIMSHAW

1. EXISTING STATION PLAN

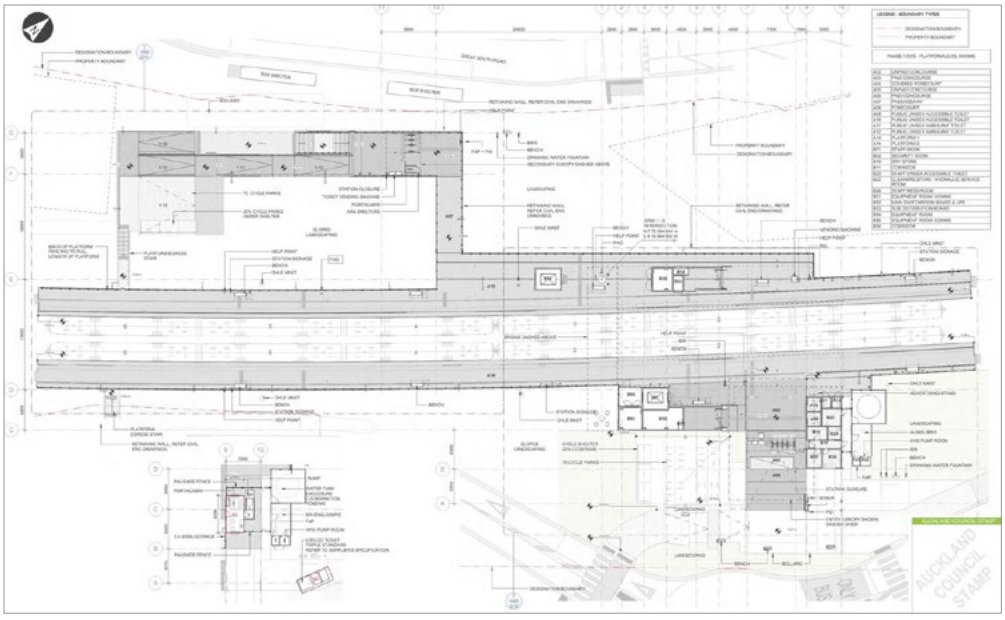


WORKSHOP 02 | STATION BENCHMARKING

GRIMSHAW

2. STATION SIZING

DRURY CENTRAL PLAN

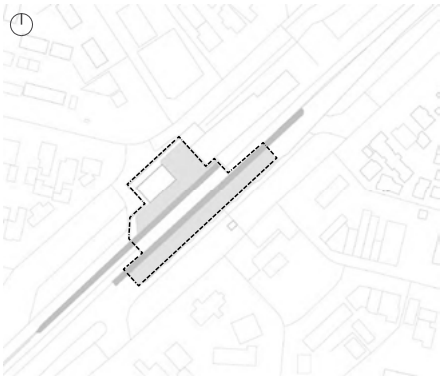


WORKSHOP 02 | STATION BENCHMARKING

GRIMSHAW

2. STATION SIZING

COMPARISON WITH DRURY CENTRAL

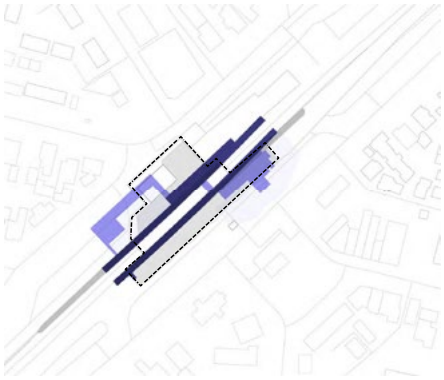


WATERLOO STATION - EXISTING

- EXISTING CANOPY & BUILDING EXTENT
- EXISTING PLATFORM EXTENT
- EXISTING CIRCULATION / CONCOURSE EXTENT

DRURY STATION

- PLATFORM EXTENT
- BUILDING & CIRCULATION
- URBAN REALM

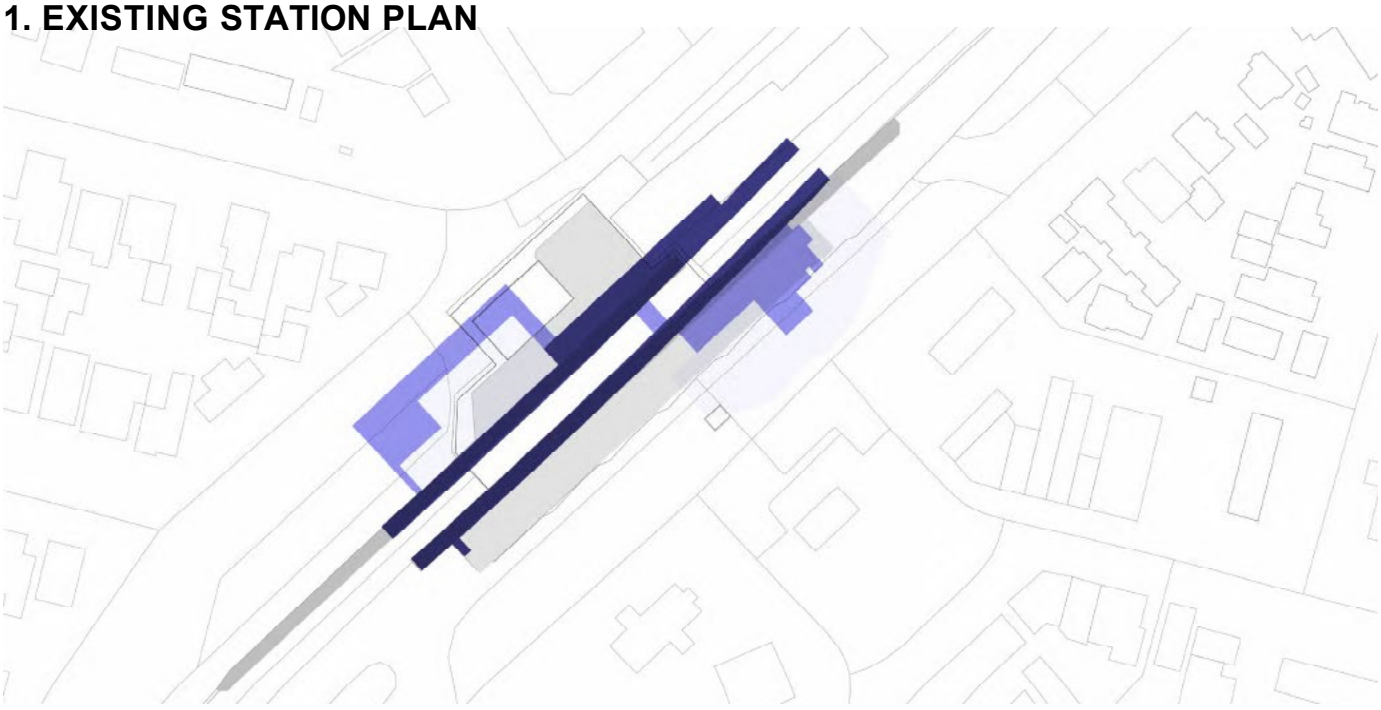


COMPARISON

WORKSHOP 02 | STATION BENCHMARKING

GRIMSHAW

1. EXISTING STATION PLAN

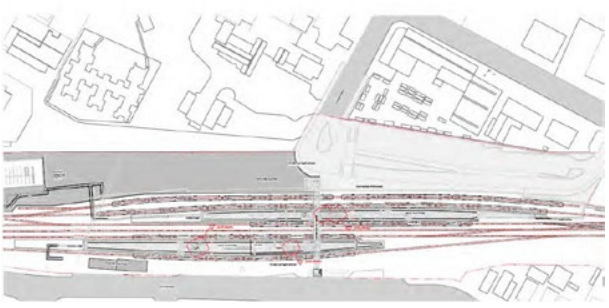


3. BENCH MARKING
CATERGORIES

BRIDGE
CIVIC
UNDERPASS

3. BENCH MARKING
PUKEKOHE

BRIDGE
CIVIC
UNDERPASS



2. BENCH MARKING

GEELONG FAST RAIL

BRIDGE

CIVIC

UNDERPASS

WORKSHOP 02 | STATION BENCHMARKING

GRIMSHAW

2. BENCH MARKING

RINGWOOD

BRIDGE

CIVIC

UNDERPASS

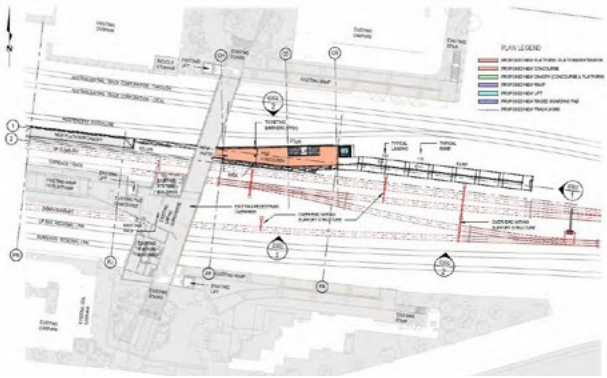
2. BENCH MARKING

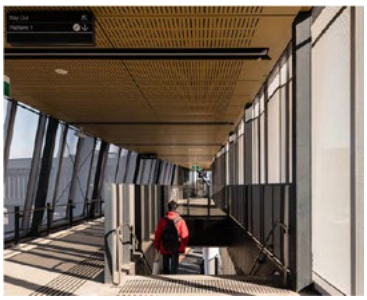
FOOTSCRAY WEST

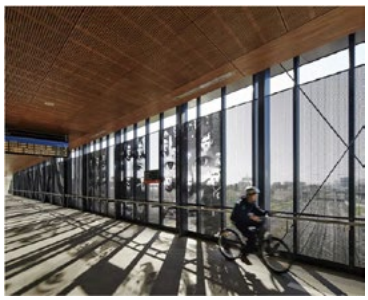
BRIDGE

CIVIC

UNDERPASS







WORKSHOP 02 | STATION BENCHMARKING

GRIMSHAW

2. BENCH MARKING

TAWA STATION

BRIDGE

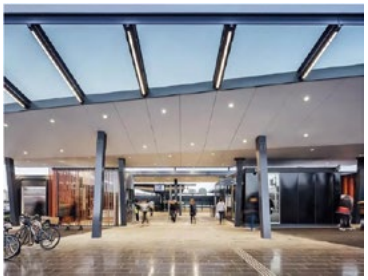
CIVIC

UNDERPASS

2. BENCH MARKING

ORMOND

BRIDGE
CIVIC
UNDERPASS



WORKSHOP 02 | STATION BENCHMARKING

GRIMSHAW

2. BENCH MARKING

GARDINER

BRIDGE
CIVIC
UNDERPASS

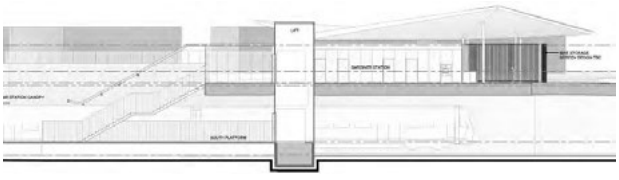


Figure 1.1.1 Station entry

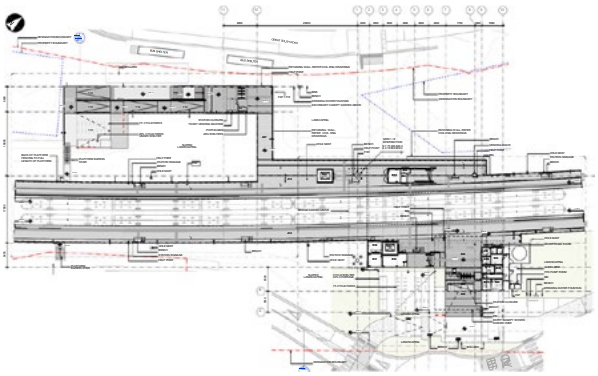
Figure 1.1.2 Station forecourt

Figure 1.1.3 Station forecourt

Figure 1.1.4 Precinct diagram

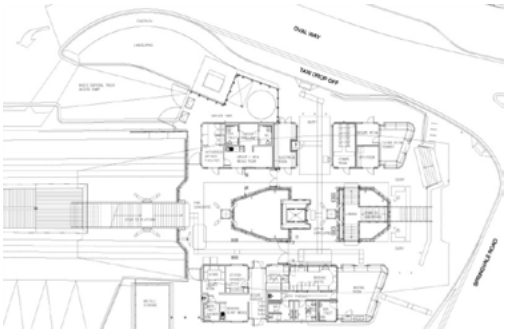
2. BENCH MARKING
DRURY CENTRAL

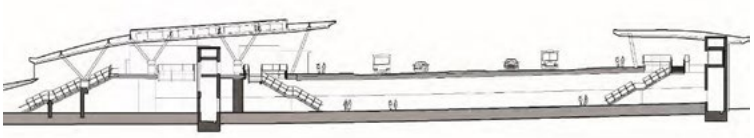
BRIDGE
CIVIC
UNDERPASS



2. BENCH MARKING
NUNAWADDING

BRIDGE
CIVIC
UNDERPASS





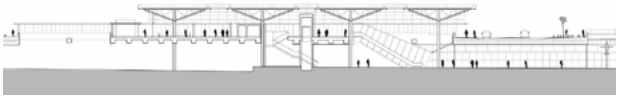
2. BENCH MARKING

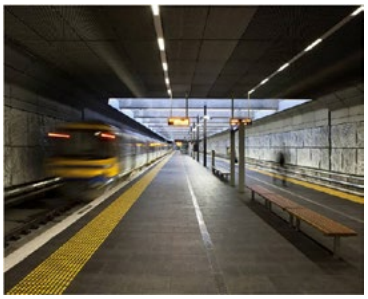
NEW LYNN

BRIDGE

CIVIC

UNDERPASS





WORKSHOP 02 | STATION BENCHMARKING

GRIMSHAW

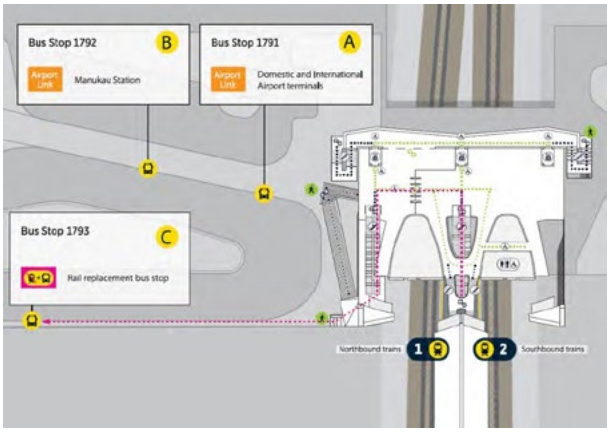
2. BENCH MARKING

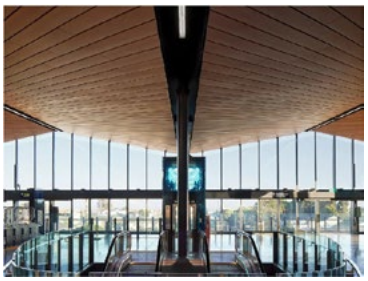
PUHINUI

BRIDGE

CIVIC

UNDERPASS





WORKSHOP 02 | STATION BENCHMARKING

GRIMSHAW

2. BENCH MARKING

SYDNEY LIGHT RAIL

BRIDGE
CIVIC
UNDERPASS

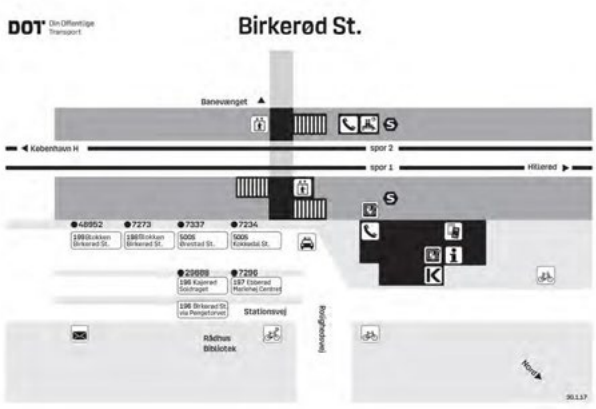
WORKSHOP 02 | STATION BENCHMARKING

GRIMSHAW

2. BENCH MARKING

BIRKERØD STATION

BRIDGE
CIVIC
UNDERPASS



3. BENCH MARKING

AVIATION STATION, MELBOURNE

BRIDGE

CIVIC

UNDERPASS

- Modifications to an existing underpass to improve access and overall amenity
- New ramps and stairs running adjacent to the platforms
- Canopies over ramps and stairs
- Metal retaining walls sloped to improve spatial quality (CPTED)
- Ramps and stairs integrated with generous terraced landscape
- Feature and functional lighting improvements

3. BENCH MARKING

BOWEN PLACE CROSSING, CANBERRA

BRIDGE

CIVIC

UNDERPASS

- Pedestrian and cycle underpass connection
- Simple robust materials
- Splayed retaining walls improve spatial quality
- Integrated landscape
- Clear sightlines

WORKSHOP 02 | STATION BENCHMARKING

3. BENCH MARKING

ESSENDON STATON,
MELBOURNE

BRIDGE

CIVIC

UNDERPASS

- Modifications to an existing underpass to improve access and overall amenity
- New ramps and stairs running adjacent to the platforms
- Canopies over ramps and stairs
- Metal retaining walls sloped to improve spatial quality (CPTED)
- Ramps and stairs integrated with generous terraced landscape
- Feature and functional lighting improvements