RiverLink

Greater Wellington Te Pane Matua Taiao

HUTT CITY TE AWA KAIRANGI

WAKA KOTAHI NZ TRANSPORT AGENCY

PROUDLY DELIVERING New Zealand Upgrade Programme

RiverLink

Notices of Requirement for Designations and Applications for Resource Consent

Volume Four: Supporting Technical Reports

Technical Report #9

Traffic Impacts and Transport Integration

IN THE MATTER OF	The Resource Management Act 1991
AND	
IN THE MATTER OF	Resource consent applications under section 88, and Notices of Requirement under section 168, of the Act in relation to the RiverLink project
BY	**Waka Kotahi NZ Transport Agency** Requiring Authority **Greater Wellington Regional Council** Requiring Authority **Hutt City Council** Requiring Authority

---

RIVERLINK
TECHNICAL ASSESSMENT #9
TRAFFIC IMPACTS AND TRANSPORT INTEGRATION ASSESSMENT

Table of contents

Table index

Figure index

Appendices

1 INTRODUCTION

1. My full name is Duncan Barry Tindall. I hold the position of Technical Director in the Transport Planning and Traffic Engineering team at GHD New Zealand Limited (GHD).
2. I have been assisted in my assessment by Will Bull, Angelia (Zhixuan) Cao and Sharath Kotha who have completed intersection modelling, and assessment under my supervision. I have also relied on the work of Flow Transportation Specialists led by Ian Clark who have undertaken transport network modelling to support my assessment.

1.1 Qualifications and experience

3. I hold the academic qualifications of Masters of Science in Traffic and Transport from the University of London (Centre for Transport Studies) and a Masters of Engineering in Civil Engineering, also from University of London (Imperial College). I am a Member of Engineering New Zealand.
4. I have worked in the field of transport for 23 years and have been working and living in New Zealand since 2010. During this period I have worked on a range of transportation planning projects, development planning and development control across New Zealand. Prior to joining GHD in 2019 I was an Associate with Beca New Zealand and an Associate Director with AECOM New Zealand limited.
5. Prior to undertaking my assessment, I visited the site on several occasions. I was also present throughout two public open days that were held in support of the scheme, during which time I discussed a range of transport and traffic related issues with the community.

1.2 Code of Conduct

6. I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2014. This assessment has been prepared in compliance with that Code, as if it were evidence being given in Environment Court proceedings. In particular, unless I state otherwise, this assessment is within my area of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

1.3 Background

7. RiverLink is a partnership project between Greater Wellington Regional Council (GW), Hutt City Council (HCC) and Waka Kotahi NZ Transport Agency (Waka Kotahi), together with Mana Whenua partners Ngāti Toa Rangatira (Ngāti Toa) and Taranaki Whānui ki Te Upoko o Te Ika (Taranaki Whānui), collectively known as the Project Partners. RiverLink has arisen to address flood protection issues, transport resilience, accessibility, efficiency and safety issues at the Melling intersection on State Highway 2 (SH2) and urban renewal and regeneration of Lower Hutt central city. RiverLink seeks to resolve these issues and provide an integrated design solution that achieves the best outcome for Lower Hutt.
8. RiverLink is the brand adopted by the Project Partners for the collective and integrated approach to a series of projects within a 3 kilometre section of the Te Awa Kairangi/Hutt River (the River) between Kennedy Good Bridge and Ewen Bridge and the immediate urban environs on either side, including the edge of Lower Hutt as it meets the central city.

1.4 The RiverLink Project

9. RiverLink's three separate but interdependent projects include:

   i. Flood Protection (GW) - widening Te Awa Kairangi/Hutt River channel and berms and raising the height of the stopbanks

   ii. Urban regeneration (HCC) - urban renewal and regeneration through improved access from the central city to and alongside the river through the creation of a promenade, a new pedestrian bridge, a riverside park and attractive supporting development, and

   iii. Melling Intersection Improvements (Waka Kotahi) - a new grade separated interchange and river bridge at Melling, new intersections with local roads, enhanced pedestrian and cycle routes and better public transport integration at a new Melling Railway Station.

1.5 Scope of assessment

10. My assessment addresses the following matters:

   i. The methodology I have used to assess the transport and traffic impacts of the Project

   ii. The effects of the Project on walking access and safety

   iii. The effects on the safety and accessibility for cyclists of varying levels of confidence and trip purpose

   iv. The effects on access to and from bus services within the Project area

   v. The effects on the efficiency of the bus network within the Project area

   vi. The effects on access to and from the relocated Melling Station

   vii. Changes to the provision of public parking in the Project area and vicinity

   viii. Access to private properties affected by the Project

   ix. Assessment of the traffic and transport effects during the construction of the Project, and

   x. The mitigation of adverse effects identified through the above assessment.

1.6 Assumptions and exclusions in this assessment

11. In preparing this assessment I have relied upon traffic data collected prior to March 2020 for previous phases of the Project, or components thereof. This reliance is necessary due the impact of Covid-19 on the traffic patterns within Lower Hutt during the period of my assessment.

12. I have also relied on the construction methodology and design information presented to me. The construction method is described in Chapter 5 of the AEE. The design information is included in Volume 5 of the AEE (General Layout Sheets – A16-481-C201-C205). I expect that there will be some changes to the details of the scheme as subsequent phases of design occur, however I have assumed that the form and function of the Project would be in general accordance with that shown.

13. During the development of my assessment I met with Tracy Bergman and Barry Fryer (GW), John Gloag and Damon Simmons (HCC), William Wallace and Tony Brennand (Waka Kotahi).

14. In assessing the traffic effects of the scheme, I have relied on traffic modelling undertaken by others, as detailed in the Traffic Modelling Memorandum included as Appendix A. Within this memorandum the details of the wider assumptions in relation to future growth and other potential transport interventions are included. These assumptions are consistent with other scheme planning and assessment across the Wellington Region.

15. Within the scope of my assessment I have not considered matters related to the geometric alignment of the highway as this is outside the scope of my experience.

16. The following supporting information is attached to this report:

    i. Appendix A – Traffic Modelling Report

    ii. Appendix B – Road Classification

    iii. Appendix C – Existing Road Volumes

    iv. Appendix D – Existing Bus Network

    v. Appendix E – Historic Crash Detail

    vi. Appendix F – Pedestrian Overbridge Assessment, and

    vii. Appendix G – Forecast Traffic Flows

2 EXECUTIVE SUMMARY

2.1 Existing environment

17. My assessment of the current environment of the Project area as it pertains to the scope of my report has identified the following key features:

    i. The Melling Interchange at State Highway 2 (SH2) creates delays to the movement of traffic along SH2, and is of a form that is not aligned with the principles of design for the safety of all users;

    ii. The connection between Melling Station and central area of Lower Hutt for pedestrians and cyclists is not well supported by the current infrastructure, particularly in relation to the ability to cross-roads;

    iii. The roads within central area of Lower Hutt are used by a proportion of the through traffic as well as those with a local destination; and

    iv. The Riverbank car-park (with approximately 850 public parking spaces) is the single largest public car-park facility available during the week, but only forms approximately 25% of the public car parking in the Project Area, with the balance provided by on-street parking and smaller public car parks.

2.2 Assessments undertaken

18. I have undertaken assessments of the transport effects of the Project, specifically in relation to

    i. Safety;

    i. Network resilience;

    ii. Accessibility by active modes;

    iii. Bus journey times; and

iv. Traffic flow and delays

v. Resilience.

19. Noting the work undertaken earlier in the development of the Melling Interchange component of Riverlink, and the safety issues of the current layout, I undertook a quantitative assessment of the safety effects of the proposed grade separation of SH2 at Melling Interchange. This showed a significant safety benefit for road users, likely due to the key changes of the Project, including the removal of SH2 traffic from intersections, and the removal of conflict between through and turning traffic at the interchange. The model predicts an annual injury crash rate of 0.3 per annum, compared against the existing situation which shows a recorded injury crash rate averaging 4 per year, over the past 5 years. This is considered to also likely to reduce the death and serious injuries (DSIs) on SH2 at the interchange.

20. For the remainder of the Project area I undertook a qualitative assessment of the safety benefits of the Project. My assessment showed benefits for active mode users arising from the new network of paths and on-road infrastructure, and particularly the signalisation of the roundabouts in central Hutt.

21. The Project will have a positive effect on public transport as a result of the improved access to the central city from the relocated Melling Station and improved journey time and reliability through Lower Hutt central city. These benefits to passengers can be attributed to:

    a. Improved reliability of bus services at peak times through the conversion of roundabouts to signals;

    b. Better access between the central city and the rail station to reduce the barriers to access for rail services to the wider region;

    c. Increased capacity for bus to rail connections at the relocated Melling station to enable greater potential catchment and service frequency.

22. In addition, the quantified benefits to on board bus journey times are:

    a. Travel time savings of about 1 minute and 5.5 minutes are predicted for the route from Lower Hutt central city to SH2 north, and about 1.5 minutes and 3 minutes for the route from Lower Hutt central city to SH2 south, in the morning and evening peak periods respectively.

    b. Travel time for inbound traffic towards Lower Hutt central city is predicted to be improved by less than 1 minute, from both SH2 north and south, in both peak periods.

23. A small number of current or potential rail users who live in the western hill suburbs and currently access rail services at the existing Melling Station will have reduced accessibility to the new Melling station, but the degree of detriment is minor and effects a small proportion of users and potential users.

24. The Project results in a nett loss of 598 public car parks and 103 car parks leased to Harvey Norman and 10 car parks from Hutt City church car park. The majority of these parking spaces are lost due to the construction of the stop bank on the area currently used to provide car parking for the public and spaces leased by Harvey Norman. Furthermore, changes to road alignments on both sides of the river impact a smaller number of on-street parking spaces.

25. For my assessment of these effects, I firstly considered the changes in the context of the overall parking supply rather than effects on a specific geographic area. I adopted this approach to reflect my opinion that that most people are seeking a space within walking distance of their destination, as opposed to a specific space when commuting or visiting for other purposes. I did however also consider the changes to parking in the context of the presence of parking bays in the proximity of frontage properties and key destinations such as businesses.

26. The assessment of the effects on traffic flows and delays has been undertaken using traffic modelling reflecting the conditions in 2036. This year was chosen to reflect a period some 10 years after the expected delivery of the project and account for residential and employment growth both within Lower Hutt and more widely across Greater Wellington.

27. In addition to a primary forecast scenario, sensitivity testing was done to ascertain the degree of confidence in the assessment with changes to the forecast conditions. The approach taken is consistent with that used for similar projects within Wellington and more broadly across New Zealand.

2.3 Potential adverse effects without mitigation

28. The Design Philosophy Report has identified that the Project will have an effect on the ability to access 138 properties in the Project area, with access to Brockelsby Roofing Products on the corner of Rutherford Street and Queens Drive the most significant adverse effect. The access to the PetVet site at 53 Rutherford Street is also a potential significant adverse effect, depending on final scheme design. Elsewhere appropriate alternate access arrangements have been incorporated in the design of the Project.

29. The reduction in parking may have a significant adverse effect on the safety for all road users and for the transport amenity of frontage properties if appropriate management of the available parking is not undertaken.

30. The construction of the Project will take several years and cover a wide area of Lower Hutt central city. There will be delays, localised access restrictions for periods of the overall Project and there is the potential for adverse safety outcomes, especially for active transport modes. During some phases of construction here will be adverse effects on the reliability and journey times through SH2 and for access and egress to Lower Hutt central city. The magnitude of these effects varies during the construction with moderate effects for longer periods and significant effects for short periods.

2.4 Potential positive effects

31. I have assessed that the positive effects of the Project include:

    i. The Project will support and enable an increase in the mode share for active and public transport modes, which is in accordance with several key National and Local policies and strategies

    ii. Improved safety to cyclists and pedestrians within Lower Hutt central city as a result of the additional paths and crossing facilities delivered by the Project

    iii. Improved multi-modal access to Melling Station and between the Melling Station and Lower Hutt central city as the new bridge provides a more direct connection over the Hutt River segregated from vehicular traffic

    iv. More reliable bus journeys arising from the signalisation of current roundabouts in Lower Hutt central city, and

v. A safer and less congested environment in Lower Hutt central city as a result of more through traffic movements occurring on State Highway 2 as the delays at Melling Interchange are removed by the grade separation.

2.5 Proposed measures to avoid, remedy or mitigate adverse effects, including conditions

32. As a result of my assessment I identified the need for the following mitigations. These are:

    i. Undertake a review of all public parking (on and off-street) in Lower Hutt central city and implement changes to the time restrictions and pricing structure to deliver the appropriate balance between parking supply and demand, with separate consideration for short and long term parking

    ii. Implement a transitional parking plan, which supports the phasing of the reduction in parking during construction and in the initial operation to allow for the availability of positive effects of the Project mode shift opportunities to be realised prior to the full reduction in parking spaces

    iii. A comprehensive Construction Traffic Management Plan (CTMP) will need to be developed which includes measures to limit the delays, prevent diversion through undesirable routes ('rat running'), and provide physical protection to segregate active modes from construction works and traffic where appropriate. Site Specific Traffic Management Plans (SSTMP) will be prepared for any specific locations or activities identified in the CTMP, to address particular circumstances, local traffic, and community travel demands for the relevant area(s).

33. With these mitigations, I consider that the adverse effects for construction would still remain, and potentially still be significant, although minimised to the extent that it is practicable to do so. My reasoning for this is that the effects of the delays for the closure of Rutherford Street would still be significant, but the duration of these delays is minimised.

34. The operational adverse effects on an area wide basis have been addressed through design, and the risk of potential adverse effects related to the parking reduction can be reduced through the application of the mitigations shown in i and ii above.

3 PROJECT DESCRIPTION

3.1 Introduction

35. A full project description is available in the Assessment of Environmental Effects Report ("**AEE"**). The following section relies on excerpts of the AEE relevant to the assessment of Transport and Traffic impacts/effects.

36. The Project is the design, construction, operation and maintenance of RiverLink. Key components of the project are as follows:

    a. Upgrade and raising of existing and construction of new stopbanks on both sides of Te Awa Kairangi/Hutt River between Ewen Bridge and Mills Street

    b. Instream works between the Kennedy Good and Ewen Bridges to re-align, deepen and widen the active river channel

    c. The replacement of the two signalised at-grade intersections of SH2/Harbour View Road/Melling Link and SH2/Tirohanga Road with a new grade separated interchange

d. Construction of an approximately 215 m long and up to 7 span road bridge with a direct connection across the River from the new interchange to Queens Drive

e. Removal of the existing Melling Bridge

f. Changes to local roads

g. Changes to the Melling Line rail network and supporting infrastructure

h. Construction of an approximately 177 m long and 4 span pedestrian/cycle bridge over the River

i. Construction of a promenade located along the stopbank connecting with future development, running between Margaret Street and High Street. This includes new steps and ramps to facilitate access between the city centre and the promenade.

j. Integration of infrastructure works with existing or future mixed-use development

k. Associated works including construction and installation of culverts, stormwater management systems, signage, lighting, network utility relocations, landscape and street furniture, pedestrian/cycle connections and landscaping within the project area.

37. Project features and associated construction works are described in further detail below. The works are guided by the Urban and Landscape Design Framework, which sets out the RiverLink vision and the urban and landscape design concepts that will guide the design development of the project, so RiverLink can be integrated into the landscape and urban environment.

38. Any numbers, area or dimensions outlined in this section are approximate and may change because of detailed design. The final design of the project (including the design and location of components such as stormwater pump stations or treatment devices) will be refined and confirmed at detailed design stage.

39. The following sections of this chapter provide more specific details of the proposals.

3.2 Melling interchange and bridge

40. The State Highway 2, Melling interchange and bridge works are shown in the General Layout Plans A16-4381-C201-C205, and the bridge plans and drawings A16-4381-S101, A16-4381-S202, A16-4381-S201 and A16-4381-S202-RB (included in Volume 5 of the AEE), and as shown in the high-level design provided in Figure 1 below.

Figure 1 New diamond interchange at Melling

41. The upgrades extend along SH2 for approximately 1.55 km. The southern end of the work begins on SH2 adjacent to 51 Pharazyn Street in Melling, passes Harbour View, Tirohanga and Block Roads, and finishes roughly adjacent to 760 Western Hutt Road, where the works tie back into the existing SH2.

42. The road design principles and parameters of the main carriageway and ramps are as follows:

    a) The carriageway has been designed to motorway standards, with access to and from the state highway obtained via the grade-separated interchange

    b) The design speed adopted for the state highway through the interchange is 110km/h, and an 80km/h design speed has been adopted for the interchange ramps

    c) The carriageway will have two 3.5 m wide traffic lanes in each direction, and 3.0 m wide sealed shoulders with wire rope barriers for shoulder protection

    d) Minimum of 10 m wide x 6.0 m high clearance envelope per carriageway to accommodate over dimension vehicles travelling under the interchange.

    e) A 4 m median between the carriageway edge lines which provides 2 m inside shoulders between the median wire rope barriers. The wire rope barriers will transition to concrete medians to the northern end of the state highway works to accommodate the existing split levels between the two carriageways.

43. The works include:

a) Construction of a new Melling Bridge, approximately 215 m long and 28 m wide

b) Removal of the existing Melling Bridge, existing piers will be cut off slightly below bed-level and removed with pier remaining below bed-level left in-situ

c) Construction of a new approximately 31 m long by 8 m high single span bridge over SH2

d) Closure of the Tirohanga Road and Block Road intersections with SH2. The SH2 upgrades also require the adjacent Melling skate park, Melling train station facilities and a number of buildings along Pharazyn Street to be relocated and/or demolished.

e) Tirohanga Road will be connected to Harbour View Road via a new link adjacent to the northbound entrance ramp. The new Tirohanga Road alignment will provide 760 Western Hutt Road a with new property access, and direct access to SH2 from this property will be closed.

f) Re-configuration of Pharazyn Street connecting to the new interchange at an intersection with the new southbound on and off ramp, and

g) Establishment of separated cycleways through the new interchange and connecting roads

h) Retaining walls ranging between 0.7 m and approximately 10 m in height are required to support the SH2 improvements including:

- An approximately 405 m long retaining wall between approximately 1.5-5 m in height running between the bank of the Western Hills and State Highway 2 underneath the new interchange
- Two retaining walls running along each side of the re-aligned section of Tirohanga Road, in the order of 192 m (the western-most wall) and 137 m in length respectively and up to 10m in height.
- An approximately 181 m long retaining wall up to 5 m in height along the northern-most portion of the SH2 upgrade leading up to the south-bound exit ramp to the new Melling Bridge
- The connection to Pharazyn Street is supported by a retaining wall in the order of 26 m in length and approximately 3 m in height.
- Along Pharazyn Street south of the pedestrian bridge – approximately 226 m in length and approximately 0.7 m in height

i) Retaining walls and batters between 0.2 m and approximately 3 m in height along Queens Drive and Rutherford Street are also required to minimise the bridge landing impacts on private property. The approximate height, length and location of these retaining walls are as follows:

- A retaining wall of 1.5 m in height, 66 m in length within and along the property boundary of 28-46 Rutherford Street. .
- A retaining wall 2.8 m in height, 134 m in length along the property boundaries from 45-49 Rutherford St, and 144 Queens Drive into 317-327 High Street.
- A retaining wall of 1.5 m in height, 33 m in length along and within the boundary of the property at 53 Rutherford Street.
- A batter slope of 2.3 m in height, 90 m in length along and within the boundary of the property at 51 Rutherford Street and 297-301 High Street.

3.3 Melling station and line

44. The Melling station works are shown in the Schematic Landscape Plans A16-4831-L201-208. The intent of the works is to create a multi-modal transport hub with a pedestrian focus which fits within the re-aligned SH2 and stopbanks. The new Melling station works incorporate the following elements and changes:

    a) The existing Melling railway line will be realigned and truncated by approximately 450 m to sit alongside the new intersection between Pharazyn St and Marsden St (shortening the existing line). The re-alignment and truncation of the line will not preclude a future extension to the Melling Line further north if required

    b) Building a new train station or re-locating the existing Melling train station building to a new location south of the existing station

    c) A new train platform with a minimum length of 120 m

    d) A new bus hub with provision for at least 2 buses, accessible from Pharazyn Street

    e) A drop-off bay located in proximity to the park-n-ride facilities and away from the public transport facilities

    f) Cycle parking spaces located away from the park-n-ride carpark in the interests of safety; and

    g) New park-n-ride facilities, with approximately 201 car parks provided including 3 accessible car parks

3.4 Local roads

45. The changes to the local roads including new walking and cycling paths are shown in the General Layout Plans A16-4831-C201-C211 and involve:

    a) Road stopping of parts of Melling Link, Daly Street, Marsden Street, Fraser Street, Block Road Margaret Street, and Pharazyn Street

    b) Re-alignment of the road network including parts of Marsden Street, Pharazyn Street, Harbour View Road, Tirohanga Road, Queens Drive, Andrews Avenue and High St

    c) Tama Street currently intersects with Victoria Street exit ramp and will continue to do so. Where it differs is that a new connection to Victoria Street proper will be constructed

    d) Dudley Street will become a two-way street

    e) A new priority-controlled intersection between Harbour View Road and the re-aligned extended Tirohanga Road

    f) Provision of a connected cycle and pedestrian network which seek to improve east-west connections across central Hutt City and connects with the wider walking and cycling network. This includes new paths and upgrades to the existing shared paths as follows, including the approximate path widths:

        - An on-road cycle path 1.5 m in width along Pharazyn Street, beginning at the intersection between Marsden Street and Pharazyn Street and ending at Bridge Street; and / or
        - A separated[1] cycle path approximately 3 m wide ,(with some departures if needed) beginning at the new Melling Station travelling south alongside the relocated and

[1] A cycling lane physically separated from the other road traffic

existing railway tracks to tie into the existing cycle path (the Pito-One to Bridge Street section of Te Ara Tupua) at Bridge Street

- A separated on-road cycle path approximately 3 m or 1.5 m in width which begins at the southbound off ramp and travels under the southbound on and off ramps and the proposed Melling Interchange Bridge and then either connects into Pharazyn Street or continues back onto SH2. The path can also continue up the southbound offramp, which is bi-directional, to gain access to the Western Hills suburbs via the grade separated intersection, or use the new Melling Bridge to access the Lower Hutt city centre. The separated southbound on road offramp also connects into the segregated path under the new Melling Bridge. This segregated path travels past the old Melling Bridge location, to connect into an upgraded shared[2] path travelling along the toe of the highway ramp embankment and connecting into the existing haul road. This path will utilise the existing haul road to the connection at the Kennedy Good Bridge
- A segregated 4.5 m wide path along the TRB berm of the river and travelling north from Ewen Bridge to tie into the upgraded segregated path referred to in the point above
- A shared 4.5 m wide path along Pharazyn Street north, past the pedestrian bridge to connect to southern shared path along the new Melling Bridge
- Shared 4.5 m and 3 m wide paths along the sides of the new Melling Bridge and interchange. These shared paths will cross the interchange using signalised pedestrian crossings, and connect to the shared paths along the TRB
- Shared 4.5 m wide paths connecting between Rutherford Street, the new Melling Bridge, and the stopbanks at the Melling Bridge landing on the True Left Bank (TLB)
- A segregated[3] 3 m wide path over the new pedestrian bridge, connecting to the new shared path along Pharazyn Street; and
- A new shared 4.5 m wide pathway atop the new TLB stopbanks between Ewen Bridge and Mills Street

g) Reconfiguration of local roads to better accommodate active transport modes (walking and cycling). The changes include:

- A portion of the former Daly Street becoming a ‘shared space’ street in proximity to the new pedestrian and cyclist bridge
- A new pedestrian accessway and service lane extending from Laings Road to the stopbanks
- Changes to Bridge Street, Dudley Street, Andrews Ave, High Street, Queens Drive, Marsden Street, Pharazyn Street Margaret Street, Rutherford Street, Woburn Road and Victoria Street to create better pedestrian and cycling facilities by way of broadened footpaths and advance on-road stop lines for cyclists
- A signalised crossing on Pharazyn Street connecting the new pedestrian bridge to the new railway station site

h) Changes to the configuration of the following intersections:

- Queens Drive and Woburn Road – becoming signalised

[2] A shared path is an off-road path which is wide enough to accommodate both walking and cycling
[3] A segregated path is a shared walking and cycling path, where there are pavement markings delineating the cyclist portion of the path

- Melling Link and Rutherford Street – becoming signalised
- Melling Link and High Street – becoming signalised
- Queens Drive and Rutherford Street (new Melling Bridge landing) – becoming signalised
- Queens Drive and High Street (both ends) – becoming signalised
- Daly Street & High Street – the existing roundabout will be closed as Daly Street will not exist
- Margaret Street and Dudley Street – priority controlled intersection
- Andrews Avenue and Dudley Street – becoming priority controlled intersection
- High Street and Fraser Street – High Street to be re-aligned along Fraser Street
- Marsden Street and Pharazyn Street – the priority changes to Pharazyn Street
- Marsden Street and Railway Avenue - becoming a split signal and signalised intersection
- Tama Street - a new connection to Victoria Street will be constructed

46. Re-configuration of car parking through the Project Area, as shown in the General Layout Plans C201- C211 and Schematic Landscape Plans L201-L208, with loss of 1,479 car parks, and a gain of 768 car parks, resulting in a net loss approximately of 598 public car parks and 113 privately leased car parks including:
    - Removal of approximately 854 public car parks from the existing Riverbank carpark and reinstatement of approximately 420 car parks in the re-configured carpark following completion of the river works
    - Removal of approximately 103 private parking spaces from the leased Harvey Norman riverbank carpark
    - Removal of approximately 62 on-street car parks on Daly Street
    - Removal of approximately 8 on-street car parks at the southern end of High Street
    - Removal of approximately 18 on-street car parks on Dudley Street
    - Removal of approximately 130 on-street car parks on Pharazyn Street and replacement of approximately 34 on-street car parks on re-aligned Pharazyn Street
    - Removal of approximately 38 on-street car parks on Marsden Street and replacement of approximately 83 on-street car parks on re-aligned Marsden Street
    - Removal of the existing Melling Station park-n-ride facilities which currently provide 187 car parks, and replacement with approximately 201 car parks next to the new Melling Station (part of the park-n-ride facilities at Melling Station)
    - Removal of approximately 12 on-street car parks on Mills Street
    - Removal of approximately 21 on-street car parks on Block Road
    - Removal of 4 on-street car parks on Rutherford Street
    - Removal of 2 on-street car parks on Queens Drive
    - Removal of approximately 40 private parking spaces from the Hutt City Church car park, and replacement of approximately 30 parking spaces

3.5 Pedestrian bridge, and riverside promenades

3.5.1 Pedestrian and cycle bridge

47. The new pedestrian and cycle bridge will span the stopbanks to provide a direct connection between the relocated Melling railway station and Lower Hutt central area. This bridge is approximately 175 m long, with a 6 m wide deck to accommodate walking and cycling users. The bridge will be supported on three concrete piles extending into the riverbed and aquifer, creating a straight, four-span bridge, with abutments integrating into the stopbank on both the TLB and the TRB. Ground improvements will be required for the bridge abutments. The pedestrian bridge detail is shown in the Pedestrian and Cycle Bridge Plans numbered L501-L503.

48. Specific facilities include a 3 m wide segregated cycling path along the bridge, and the provision of both steps and ramps at both ends, with gradients of no more than 1:20 to enable access and use of the bridge by a range of users including cyclists, pedestrian, and wheelchair users. A signalised pedestrian crossing across Pharazyn Street will connect the pedestrian bridge and the new Melling Station. The bridge will also be a key opportunity for cultural expression.

49. A new walking promenade located between Margaret Street and High Street will be constructed to sit atop of the stopbank and connect to cantilevered first floor balconies of the future building development. Stairs and ramps will also be built concurrently for access between the city and the promenade.

3.6 Design process

50. The design process has included an iterative and incremental process of assessment and design changes in order to efficiently deliver the Project outcomes whilst mitigating adverse effects. As such the Project as described includes a series of mitigations for adverse, or potential adverse effects.

51. The land requirements of the Project have been minimised wherever possible, along with the loss of parking both on and off street.

52. The design of the Melling interchange does not preclude a future extension of the rail line to the north of Lower Hutt central area. From a transport perspective, this flexibility in design does not preclude the rail line extending to the north through the new Melling interchange.

53. In the design process, consideration was given to providing an overbridge for pedestrians from the new rail station to Harbour View over SH2. This was considered in recognition of the additional walk distance (described in Chapter 5) arising from the relocation of the station for these residents. However, when I accounted for the gradient on the western side of SH2 it was evident that a long series of zig-zags would be needed to provide a path that would be compliant with accessibility requirements. In addition, the catchment of the connection would have been very modest, again considering the hilly terrain. Details of our assessment process are contained in Appendix F. The conclusion from this process (that I support) was that the option was not justified. As a result, it was not incorporated in the Project design.

4 ASSESSMENT METHODOLOGY

4.1 Introduction

54. This section describes the methodology I used to assess the potential effects of the Project on the transport environment, including effects on:

    i. travel mode choice

    ii. active modes (walking, cycling)

    iii. public transport

    iv. private traffic

    v. freight movements (traffic flows and travel times and journey reliability), and

    vi. parking availability, and the access to parking.

4.2 Guidance and scope

55. When preparing this assessment I have taken into account the guidance from Waka Kotahi Research Report 422 – Integrated Transport Assessment Guidelines[4] (2010).

56. The guidelines identify that "an ITA will often be required as part of the AEE to consider the physical and environmental issues associated with the proposal".

57. In assessing these issues, the guidance states the following actions are necessary:

    i. **Focus on all potential effects including cumulative effects:** it is important to assess what the future effect will be of a proposed transportation facility or land use development including, if appropriate, the objectives, policies and rules in the district plan.

    ii. **Consider the issues** of congestion, induced traffic, social effects, land transport noise, air quality and climate change etc.

    iii. **Consider all proposals in the context of supporting a broader transport strategy**, eg a Regional Land Transport Strategy (RLTS), any regional or district plan transport strategies, and the content of any regional growth strategy. (Note that the Regional Land Transport Plan has replaced the RLTS since RR422 was published and we have substituted this document in this assessment).

    iv. **Be aware of changing public attitudes, expectations and perceptions** concerning acceptable effects and acceptable levels of transportation accessibility in relation to land transport.

58. In noting the guidance above, I have considered that the appropriate scope for my assessment should include:

    i. Active transport network (walking and cycling)

    ii. Public transport network (including rail and buses)

    iii. Road network (general and freight traffic)

    iv. Safety for all modes and users

    v. Parking, and

    vi. Property Access.

[4] RR 422 Integrated transport assessment guidelines (nzta.govt.nz)

59. Whilst my scope is limited to the items above, I have provided data which has been used by others to assess the societal, noise and air quality effects. This data has also been used within the calculations used for stormwater design and assessment.

4.3 Scale of effects

60. In undertaking my assessment, I have used a graded approach to describing effects. The nature of this assessment, considering the variety of transport modes that are impacted means that there is a subjective nature to this classification. In order to provide transparency to my assessment I used the following as the basis for the descriptions of scale of adverse effects:

    i. **Negligible** – A consequence of the scheme that results in a theoretical effect but one that would be unlikely to be observable in reality.

    ii. **Minor** – a change that may not be noticed by an affected individual, would not lead to a change in behaviour, or a change that has a noticeable effect on a small proportion of effected people without any individual being 'significantly' affected

    iii. **Moderate** – noticeable to an affected individual, and some people may change their behaviour including time of travel, considering changing mode for some trips. May make things harder, but not impossible, and

    iv. **Significant** – Widespread effect or an effect that results in the need for multiple people to change their behaviour. This includes removing the option to utilise a preferred mode of travel, require a detour with an increase in journey time of distance of more than 20%.

61. I used an equivalent scale for positive effects.

4.4 Active transport network

62. The assessment of the active transport network, referring to walking, cycling, and micro-mobility modes, has been undertaken using primarily qualitative assessments of changes in the quality of the connections, and the directness of travel routes. The assessment has been informed by the facilities detailed on the scheme drawings, as shown in Volume 5 of the Application.

63. I based my assessment on the general presence of facilities to support walking and cycling, but I gave more weight to facilities which provided connections along key 'desire lines'. Desire lines are theoretical lines between locations that generate or attract a concentration of journeys that is higher than surrounding areas. An example of this is between Melling Station and Lower Hutt central city, a clearly concentrated desire route.

64. Other desire lines include the linkage from the Hutt River Trail to the Riverbank, and routes to destinations such as Queensgate and High Street.

65. With the very high motorised commute rate at 73.4% in the last available survey, compared to 6.9% for walking and cycling combined, a small reduction in the proportion using car would lead to a very significant increase in the number of people walking and cycling.

66. Detailed modelling has not been undertaken for potential patronage on specific active mode routes. Whilst there has been strong growth in recent years, the effects of the Project on the active transport network are primarily related to what is enabled. This reflects a stronger focus on transport amenity (route length, gradient, perceived safety) for active modes than for vehicular travel where the journey time is impacted by capacity constraints (queues and delays).

67. It is recognised that there is an interdependency between the assessment of effects for active modes, the assessment of effects for transport and the assessment of effects for urban design. My assessment was prepared in conjunction with the urban design assessment to support a consistency in approach.

68. Whilst primarily a qualitative assessment, the traffic models provide information related to the pedestrian delays to cross at signalled intersections. Where there is a signalled pedestrian crossing at an intersection, the average delay for a pedestrian to cross the intersection was taken from the model as a baseline to inform the qualitative assessment.

4.5 Safety

69. For the quantitative safety assessment I have followed the approach for assessment detailed in the Waka Kotahi High Risk Intersections guide. My assessment considered the interchange as two separate signalled intersections with the crash risk summed.

4.5.1 Public Transport

70. The assessment of the public transport considered both the in vehicle effects such as travel time and journey reliability, and the access to and from stations and stops. The latter has an interdependency with the active mode network assessment.

71. The assessment of public transport did not include assessment of amendments to the frequency or timing of rail services as this was considered independent to the Project. Equally, the assessment of potential mode shift related to changes to the bus network was excluded from assessment as again this was considered to be independent of the assessment.

72. The Project effects on public transport was therefore driven by the following aspects:

    i. Changes in journey time

    ii. Journey time reliability (from Saturn and SIDRA model)

    iii. Any direct impact on bus routes and stop locations, and

    iv. Access implications for the relocated stations, including active modes, bus and private vehicle (for Park and Ride).

4.6 Road network (general and freight traffic)

73. The assessment of the Project effects on the road network has considered the changes to the traffic flows, including the proportion of freight vehicles. The travel times, both along individual links and between key points on the local network including the delays at intersections have been used as indicators of the effects.

74. The effect on wider traffic distribution has been included, specifically in relation to re-routing, or the potential for re-routing, between Dowse Interchange, Melling Interchange and Kennedy Good Bridge. These three interchanges with SH2 allow vehicles to transition between the State Highway Network and the local road network.

75. As part of the road network assessment I considered the resilience of the network to allow for planned and unplanned events that may result in re-routing between these three interchanges.

76. The broader study area used for the assessment is shown in Figure 2 below, highlighting the three locations to access central Hutt via SH2.

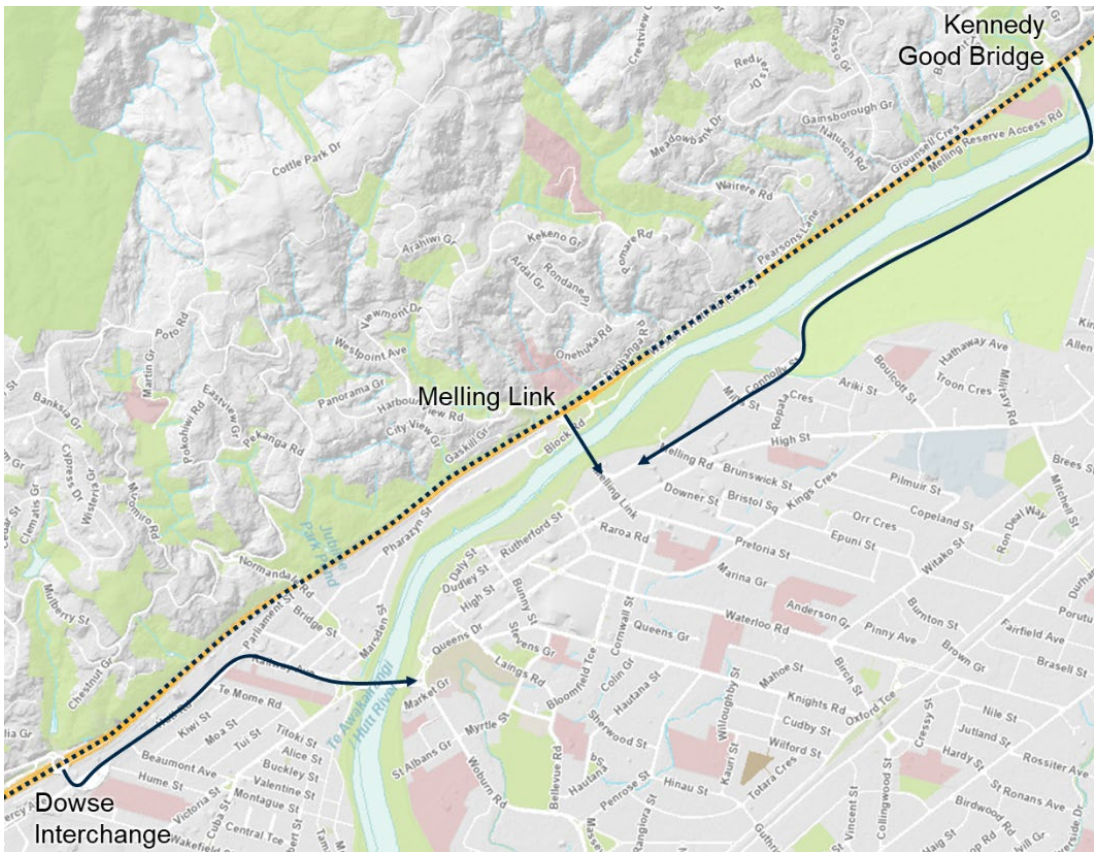


Figure 2 Road network used for assessment

4.7 Assessment years

77. Waka Kotahi Research Report 422 recommends that the future year assessment be for a year at least 10 years into the future for ITAs prepared in support of designations. Where regional plans and longer term forecasts are reliably based on sound land use and transport planning projections, this may be extended further.

78. The scope of the Project is such that should construction commence at the earliest anticipated time, it would be some 5 years before it is complete (excluding the future urban development which may extend over a longer timeframe). As such a 2026 'construction year' is considered to be most appropriate, and this corresponds with the availability of a forecast scenario for the regional transport model. I also consider this to be the appropriate basis for the assessment of the construction effects, noting that this model scenario includes the impact of Transmission Gully on transport patterns, and so I consider this a more representative base than the current (2021) conditions.

79. Noting the changing environment for both land use and transport, an assessment against current (2021) conditions is not considered appropriate. The assessment has therefore been made against the following future scenarios, using clearly defined assumptions for future land use and transport infrastructure:

    i. Future network without Project ("Base Case" – 2036), and

    ii. Future network with Project ("Project" scenario 2036).

4.8 Assumed future transport environment

80. As noted in the previous section the transport network evolves over time as a result of changes to land use and as a result of policy interventions and scheme implementation to modify the availability and efficiency of the transport system.

81. In the short term, there are projects under construction which will commence operation in the near future. Beyond that there are projects which are currently being planned which if implemented would have a direct bearing on the transport environment for the Project.

82. For the purposes of this assessment, I have made the following assumptions:-

    i. Transmission Gully is open

    ii. Public Transport services (bus and rail) are not capacity constrained

    iii. No grade separation of Kennedy Good Bridge / SH2 intersection, and

    iv. The implementation of the Lower Hutt City Cycle Network, and the Te Ara Tupua – Wellington to Hutt Valley cycleway would be open.

4.9 Transport modelling

83. My assessment of effects has utilised transport modelling to provide an evidence base, as is typical for this type of assessment. The transport modelling has been undertaken by Flow Transportation Specialists Ltd, with the team led by Mr Ian Clark. The details of their assessment are included in the Transport Modelling Report I have attached as Appendix A

84. I have also followed a common approach to use a hierarchical suite of models to inform the assessment of effects. This hierarchy is shown below in Figure 3.

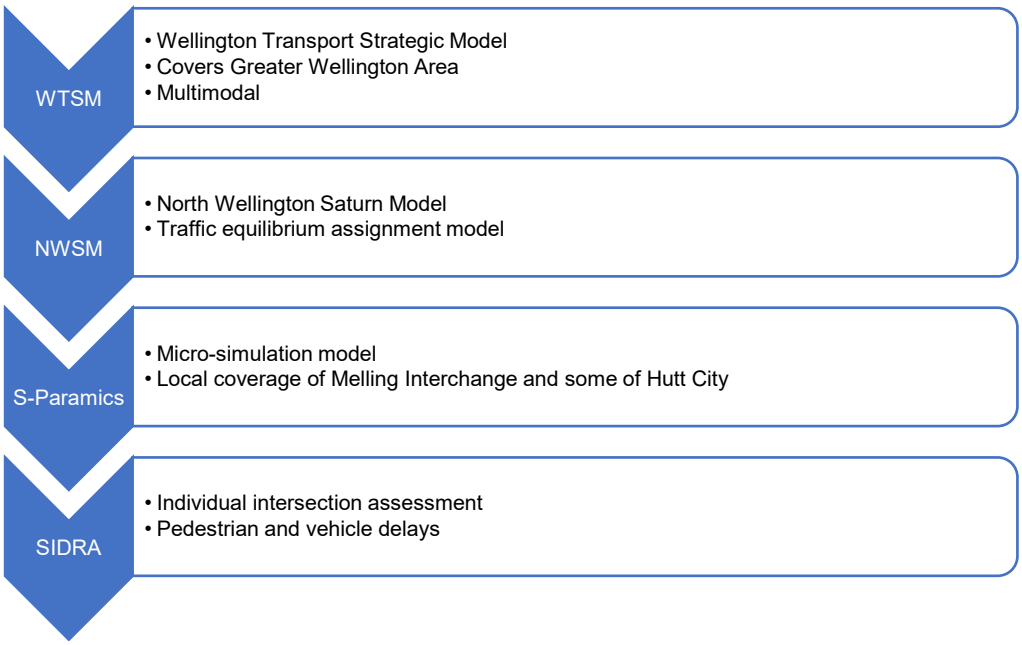


Figure 3 Transport modelling hierarchy

85. The top level of the modelling suite utilises the region wide strategic transport planning model owned by the Wellington Analytics Unit of GW. This model supplies the demand for transport in the future, accounting for the predicted increases in residential and employment across the region.

86. The forecast modelling includes a range of assumptions on changes that will affect travel demand, and these are detailed in the Transport Modelling report. However, I will specifically identify that the forecast scenario used here includes the effects from the opening of Transmission Gully, some minor increases in the frequency of buses across the region to match capacity to demand and a reflection of changes to region wide parking, travel planning policy and home working behaviours that equate to a reduction of 3% in car-based commuter demand.

87. The more localised North Wellington SATURN model is an assignment model that uses the demands from the strategic model and forecasts the routes that would be used for car-based trips. In the context of this assessment, this model is the primary tool we have used to provide the baseline traffic flows and forecast the changes expected as a result of the project. The model has a representation of both the congestion effects on the network, and drivers' response to that congestion to seek alternate routes.

88. Specifically this model is used to assess the route choice for traffic passing through the Hutt corridor, and the distribution between the state highway and the local road networks. The model includes both the Dowse interchange and the Kennedy Good Bridge interchange with SH2 and the parallel and connecting local roads.

89. The S-Paramics model has a limited extent, but covers the interchange and the intersections within Lower Hutt central city where the new Melling bridge will connect to the existing network. This more detailed model does not allow for diversions between the state highway and the local roads, and so has been used to more accurately model the effects of the delays as the intersections, including blocking back between the closely located stop lines at the Melling Interchange and within the central city, and this information is fed back into the SATURN model.

90. Finally, the SIDRA models have been used to provide the most accurate reflection of how the signalled intersections will operate. These discrete models are able to explicitly consider the interaction of pedestrian crossings and traffic, and provide a more accurate assessment of the delays and capacity of the intersections in the future.

4.9.1 Property access

91. Where the Project resulted in a specific change to the ability to access, or the route needed to reach the access, consideration was made of the distance and legibility of the alternate route. This included direct changes to individual properties and the effects of changes to the network, such as the introduction of one way restrictions or restrictions on the turns available at intersections.

4.9.2 Parking

92. The assessment of parking considered the total public parking capacity of Lower Hutt central city, and separately the suitability of that parking for short term (shopper) or long term (commuter) parking. Parking was assessed with reference to both current parking demands and future assessment years with adjustment for both mode shift and forecast land use changes associated with the project.

93. Beneath the assessment of the overall capacity, specific consideration of the availability of local parking to serve frontage properties was made. This assessment focussed on locations where the Project had a direct effect on the provision of parking, such as removing on street parking, or access to an off-street car park.

5 EXISTING AND FUTURE TRANSPORT ENVIRONMENT

5.1 Introduction

94. This section describes the existing and future (without Project) road, public transport and walking and cycling network for the Project area.

95. The Project area from a transport perspective can be generally described as the area between State Highway 2 (as the western boundary), Melling Link (as the northern boundary), Ewen Bridge (as the southern boundary) and Bloomfield Terrace & Cornwall Street (as the eastern boundary).

96. This section also describes the historic and predicted growth, traffic volumes for the 2031 and 2036 years, existing travel characteristics for general traffic and trucks and the crash environment.

5.2 Existing land use

97. The study area includes the suburbs of Lower Hutt central city and the area adjacent to the Melling interchange.

98. A detailed description of the land use zoning within the study area is included within the AEE. However, the existing land uses within the study area can be described as a mixture of commercial within Lower Hutt central city and residential further east of Lower Hutt central city, industrial, and residential land uses within Melling.

99. Of note within the study area, Melling Train Station provides connections for the residents and workers in the study area to Central Wellington. Queensgate Shopping Centre, located on the eastern edge of Lower Hutt central cu, provides a large number of retail options for residents and workers within the local area, and also serves a wider catchment.

5.3 Future land use growth

100. The study area is generally built out with very little land available for further greenfield development. The Lower Hutt Central area provides an employment precinct within the context of the local area, and there is potential for development within the Lower Hutt central city for further employment opportunities via intensification. This includes a greater quantum of residential developments within the central city area.

101. For the purposes of this assessment, the growth forecasts are those used by the Wellington Strategic Transport Model (WSTM), as agreed by the Project Partners and used consistently across Greater Wellington, for the assessment of transport projects.

102. The surrounding residential and industrial areas within Melling and Lower Hutt central city are built out and are unlikely to provide opportunity for significant further greenfield development, although redevelopment and intensification is enabled through the District Plan throughout the city and is expected within the valley floor where the topography facilitates removal of existing buildings and redevelopment via multi-unit residential townhouse development.

5.4 Road network

103. The One Network Road Classification is a classification system, prepared by Waka Kotahi, which divides New Zealand's roads into six categories based on how busy they are, whether they connect to important destinations, or are the only route available to provide access:

    i. National

    ii. Arterial

    iii. Regional

    iv. Primary Collector

    v. Secondary Collector, and

    vi. Access.

104. I have provided a table with the road classification of the roads within the study area as Appendix B.

105. The roads within the Project area are identified in Figure 4 below. This includes SH2, the Melling Link, Railway Avenue, Knights Road, Queens Drive and all the local roads within these roads.

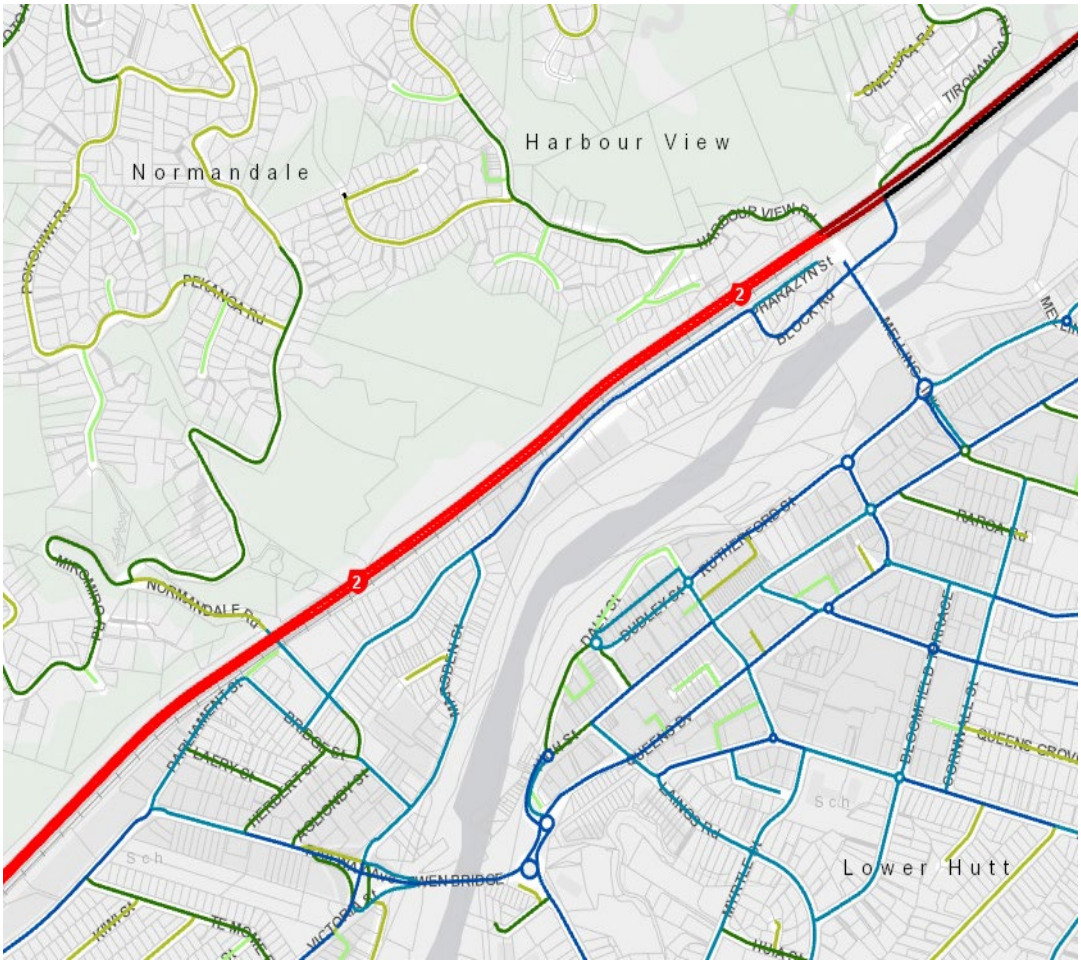


Figure 4 Overview of road in Project area

106. The study area includes SH2 which facilitates vehicular access to the north and the south along the eastern side of the north island. SH2 is a key freight route for the region. The primary arterial roads within the study area that facilitate freight movements are Ewen Bridge, Melling Link, Pharazyn Street, Rutherford Street and Queens Drive.

107. Within the study area, there are two key vehicle routes[5] to provide access routes around the Lower Hutt central city, and these also provide a connection between Ewen Bridge and Melling Link. The two routes are summarised below and shown in Figure 5.

    i. Western access route: Ewen Bridge – Queens Drive – High Street – Daly Street – Rutherford Street – Melling Link

    ii. Eastern access route: Ewen Bridge –Knights Road - Cornwall Street — Melling Link

108. These two routes provide key vehicular access between State Highway 2 and suburbs to the south and south-west via Ewen Bridge. Although longer, Bloomfield Terrace provides a variant of this route avoiding the signals and roundabouts on Cornwall Street and Knights Road.

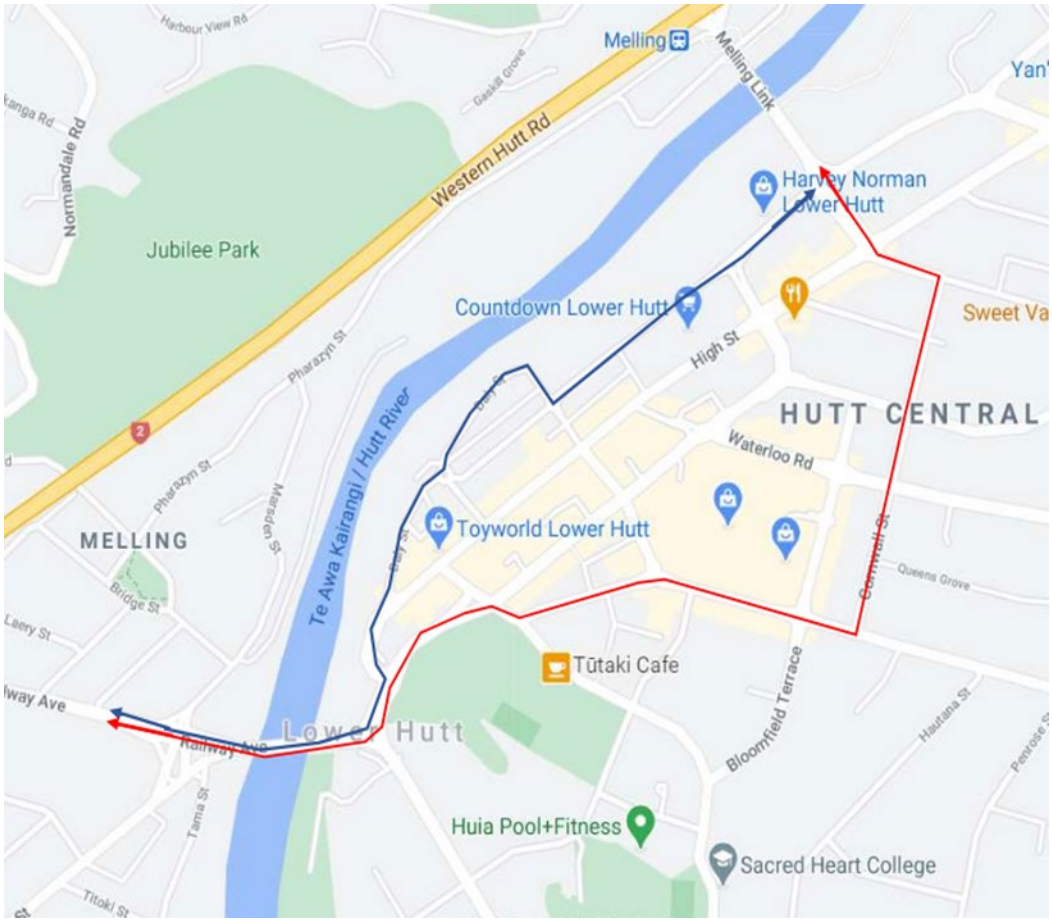


Figure 5 Alternate access routes through central Hutt

[5] Central City Transformation Plan, Hutt City, Feb 2019, Chapter 5

5.5 Existing and Future Road Network

5.5.1 State Highway 2

109. State Highway 2 is classified as a National Road. SH2 operates between State Highway 1 in Wellington and State Highway 1 in Pokeno, South Auckland. SH2 provides a key north-south connection for the North Island connecting Wellington with Masterton, Hastings, Napier, Gisborne, Tauranga, and Auckland (as well as many other smaller towns).

110. Within the study area, SH2 has a posted speed limit of 100 km/h and two lanes of traffic in each direction. At key intersections, such as Melling Link, SH2 provides additional lanes for turning to facilitate access to Lower Hutt central city. The intersection between Melling Link and SH2 is currently provided at grade, whereas the intersection between SH2 and Dowse Drive, located approximately 2.4 kilometres south of the Melling Link intersection, is provided as a grade separated intersection. The intersection between SH2 and Kennedy Good Bridge is currently an at grade intersection located approximately 2.5 kilometres north of Melling Link. Whilst I am aware of investigations and the potential for grade separation of the Kennedy Good intersection in the future, I understand that there is no current commitment or timing for this to happen.

111. The SH2 currently carries 4% HCV, being a key freight route for the local area as well as for the greater Wellington area, as outlined within the Regional Wellington Land Transport Network Plans.

5.5.2 Melling Link

112. Melling Link is classified as an arterial road and is a two-way road with two lanes travelling north-west and one lane travelling south-east. Melling Link provides a connection between SH2, the western hills, and the northern end of Lower Hutt central city. Melling Link facilitates access to the further suburbs of Epuni, Waterloo and Woburn from SH2. Melling Link has a posted speed limit of 50 km/h. There are footpaths provided on both sides of the road to facilitate pedestrian access across Hutt River but there are limited opportunities for cross road pedestrian movements.

5.5.3 Ewen Bridge

113. Ewen Bridge is classified as an arterial road and is a two-way (two lanes in each direction) road providing a connection between the western part of Lower Hutt and the southern end of Lower Hutt central city. Ewen Bridge facilitates public transport access to Central Hutt from Wellington and vice versa, via the bus network. Ewen Bridge has a posted speed limit of 50 km/h and via footpaths on both sides of the road provides a pedestrian crossing point over Hutt River.

5.5.4 Pharazyn Street

114. Pharazyn Street is classified as an arterial road which provides access between Bridge Street and Block Road within Melling. Pharazyn Street provides one lane of traffic in each direction as well as a footpath located on the southern side of the carriageway. A default urban speed limit of 50 km/h applies on Pharazyn Street. There is a bridge located at the southern end of Pharazyn Street, which has a height restriction of 4.28m.

5.5.5 Marsden Street

115. Marsden Street is classified as a Primary Collector road and provides a two-way (one lane in each direction) connection between Pharazyn Street and Ewen Bridge. Footpaths are provided on both sides of the road on Marsden Street, as well as connections to the off-road shared path that runs parallel with Hutt River. A default urban speed limit of 50 km/h applies on Marsden Street.

5.5.6 Pretoria Street

116. Pretoria Street is classified as a Secondary Collector road and provides a connection between Melling Link and suburbs to the east such as Epuni and Waterloo. Pretoria Street provides one lane in each direction, as well as parallel parking on both sides of the road and footpaths on both sides. A default urban speed limit of 50 km/h applies on Pretoria Street.

5.5.7 Rutherford Street

117. Rutherford Street is classified as an arterial road and provides a connection between Connolly Street and Daly Street within Hutt Central. Rutherford Street provides one traffic lane in each direction, as well as parallel parking and footpaths on both sides of the road. A default speed limit of 50 km/h applies on Rutherford Street.

5.5.8 High Street

118. High Street is classified as an arterial road and primary collector road within the study area, and provides connectivity between Eastern Hutt Road and Queens Drive. Within the study area, High Street provides one traffic lane in each direction, as well as parallel parking and footpaths on both sides of the road. A default speed limit of 50 km/h applies on High Street.

5.5.9 Queens Drive

119. Queens Drive is classified as an arterial road and provides connectivity between Ewen Bridge and Rutherford Street. Within the study area, Queens Drive provides one traffic lane in each direction, as well as parallel parking and footpaths on both sides of the road. A default speed limit of 50 km/h applies on Queens Drive.

5.5.10 Daly Street

120. Daly Street is classified as a secondary collector road and provides connectivity between High Street and Margaret Street. Within the study area, Daly Street provides one traffic lane in each direction, as well as parallel parking both sides of the road and a footpath on the southern side of the road. A default speed limit of 50 km/h applies on Daly Street.

5.5.11 Bloomfield Terrace

121. Bloomfield Terrace is classified as a primary collector road and provides a connection between Kings Crescent and Laings Road. Within the study area, Bloomfield Terrace provides one traffic lane in each direction, as well as parallel and angle parking both sides of the road and footpaths on both sides of the road. A default speed limit of 50 km/h applies on Bloomfield Terrace.

5.5.12 Cornwall Street

122. Cornwall Street is classified as a primary collector road and provides a connection between Kings Crescent and Knights Road. Within the study area, Cornwall Street provides one traffic lane in each direction, as well as parking both sides of the road and footpaths on both sides of the road. A default speed limit of 50 km/h applies on Cornwall Street.

5.5.13 Andrews Avenue

123. Andrews Avenue is classified as a secondary collector road and provides a connection between High Street and Daly Street. Andrews Avenue provides one traffic lane in each direction, as well a parking and a footpath on the northern side of the carriageway. A default speed limit of 50 km/h applies on Andrews Avenue.

5.5.14 Dudley Street

124. Dudley Street is classified as a primary collector road and provides a connection between Daly Street and Rutherford Street. Dudley Street provides one lane of traffic for south bound traffic and footpaths and parking on both sides of the carriageway. A default speed limit of 50 km/h applies on Dudley Street.

5.6 Existing Traffic Volumes

125. Appendix C contains a table showing the existing Annual Average Daily Traffic (AADT) volumes of key roads within the study area in 2018. These traffic volumes were collected between 2013 to 2017.

126. Traffic volumes on the key roads were collected hourly. At locations where data had only been collected for part of the day, for example the peak hours, I calculated the AADT using a formula of 5*(AM peak volume + PM peak volume). The formula I used is an approximation that in my experience has proved applicable elsewhere over many years and locations. I confirmed the validity of the formula by assessing a sample of 24 hour counts within the RiverLink data set. Morning and afternoon peak periods were considered from 8:15 to 9:15 AM and 4:45 to 5:45 PM.

5.7 Travel characteristics

5.7.1 Public transport network

5.7.2 Melling Train Station

127. Melling Train Station is located adjacent to the Melling Link and State Highway 2 intersection and provides a key connection between the Lower Hutt central city and Wellington City via Petone.

128. The current train services during the weekday AM and PM peak periods at the Melling Train Station are as follows:

    a. To Wellington: 8 services (6:30 – 9:30am) and 9 services (3:30 – 6:30pm)

    b. To Melling: 8 services (6:30 – 9:30am) and 9 services (3:30 – 6:30pm)

129. Currently there is one bus service (145 route) that provides public transport access for the Belmont area to Melling Train Station and Lower Hutt central city.

130. There are two car parking areas provided adjacent to Melling Station to provide vehicular accessibility to the train station. There are approximately 208 parking spaces provided within these two parking areas.

131. Access for pedestrians and cyclist are facilitated by the off-road shared use path provided adjacent to Hutt River, as well as by footpaths provided on Pharazyn Street, Melling Link and Block Road.

132. Whilst somewhat dated, a survey in 2010 established that 70% of rail passengers drove to the station, and 30% walked or cycled. The location of the station results in a relatively small residential population catchment, and that catchment is predominantly to the north where the steep gradient forms a disincentive for both walking and cycling.

133. Combined with bus based park and ride from the Upper Hutt, there is a bias to passengers traveling from Melling (towards Wellington) in the AM and returning to Hutt in the PM.

5.7.3 Bus network

134. There are 13 scheduled bus services that travel to the Lower Hutt central city, 9 daytime and 4 After Midnight services. The routes are shown in the figures below.

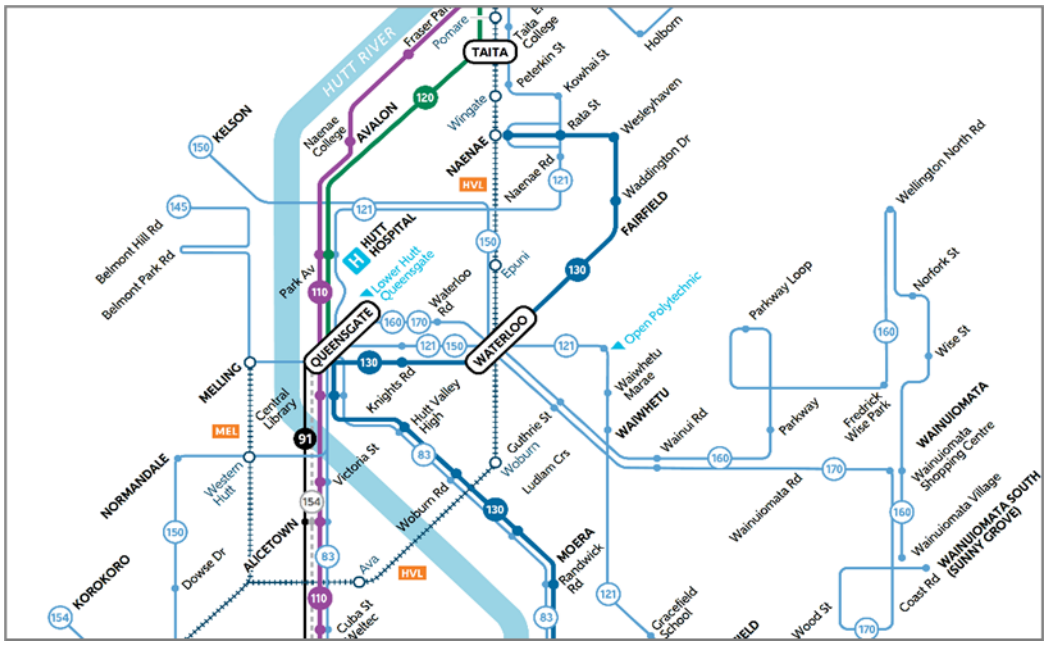


Figure 6 Day time bus routes in Project area

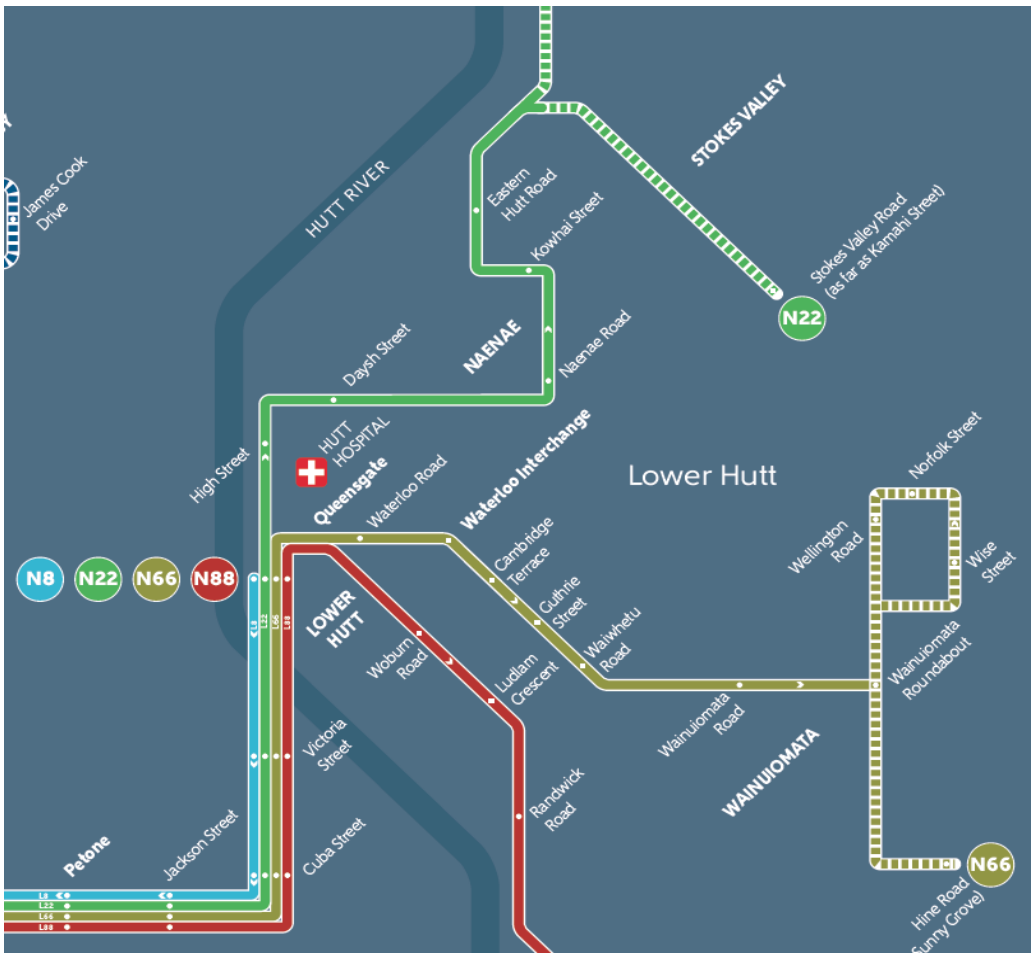


Figure 7 After Midnight bus routes in Project area

135. I prepared a detailed bus stop plan for the Project area, and it is provided in Appendix D along with the details of the bus routes and their frequency.

136. The bus routes utilise bus interchange stops on Queens Drive and Bunny Street to provide access to Lower Hutt central city and Queensgate Mall, which is a key destination within the local area. These services provide connectivity throughout the Hutt Valley and to Wellington city.

5.7.4 Cycling network

137. The major cycling connection provided within the study area is the Hutt River Trail, which runs on either side of the Hutt River. The Hutt River Trail runs approximately 29 kilometres between Petone in the south to Upper Hutt in the north.

138. The Hutt River Trail provides for recreation and commuter cyclists trips through the Hutt Valley, connecting schools, transport hubs, the Lower Hutt central city, community centres and residential areas. Further routes outside the project area have either been delivered recently (eg Wainuiomata Hill Shared Path),or are consented and construction planned to commence in late 2021 (Eastern Bays Shared Path). These facilities may provide some additional demand which potentially increases the demand for routes through Hutt. The distances involved are likely to result in fairly low volumes of these cyclists, albeit it is important to consider the need to provide a safe cohesive network for longer distance trips.

139. However, outside of the Hutt River Trail I consider the cycling network to be currently limited, with no on-road cycling paths providing east-west connections to the Hutt River Trail. For residents living to the south-east of the Lower Hutt central city, cycling is not currently supported by infrastructure, and so less confident cyclists will consider there are barriers to access as there are no dedicated cycling facilities provided within the local area.

140. To the west, Te Ara Tupua connects Lower Hutt to central Wellington. The final stage of the project has received funding, and was consented in February 2021. Construction is due to commence in the near future, and this will provide a connection that provides a high level of amenity for commuter and leisure cyclists to the west. I have assumed this project to have been implemented prior to the commencement of construction of the RiverLink project.

141. However, Hutt City is developing proposals for cycle facilities outside of Lower Hutt central city which I consider would support an increase in demand for access to and from central Hutt if part of a cohesive network of facilities. The Hutt City Cycling and Micromobility Single Stage Business Case (SSBC) is well advanced and contains a recommended programme of investment in active and sustainable mode measures for Lower Hutt, including the central city.

142. The draft Hutt Cycling and Micromobility SSBC has considered and assumed the RiverLink proposed infrastructure when developing the programme, and therefore has been developed in a manner that would be complementary and in some locations reliant on the delivery of RiverLink to be effective.

143. The draft proposed programme consists of the following schemes for the central city:

Short Term:	Connections to schools along the beltway
	Knights Road cycleway trial
Medium Term:	Formalising Knights Road cycleway
	New connections on Bellevue Road and Kings Crescent
	Cycleways in central city to align with delivery of RiverLink

144. At present there are minimal on road cycling facilities within the project area. As such cyclists when not riding on the leisure trails are required to share the roads with general traffic. In some areas this may be appropriate for confident riders, but for school children, or less confident cyclists this creates a barrier to cycling. Even for the more confident cyclists, the roundabouts in the central city provide heightened risks of collisions.

145. It is also noted that whilst cyclists are permitted to use SH2, and some of the most confident cyclists are known to use this route, there is no shoulder to the north of Lower Hutt when travelling northbound. This is as a result of the narrow width of the corridor for State Highway between the hills and the Hutt River. There are no proposals to provide a wider shoulder or formal cycling facility northbound on SH2. As such any cyclists remaining on SH2 would be within the traffic lane in some locations which operates with a 100kph speed limit.

5.7.5 Walking Network

146. Most roads within the Lower Hutt central city provide footpaths on both sides of the road, as well as opportunities to cross the road safely via controlled crossing locations (at signalised intersections and at zebra crossings).

147. Within the central city there are several roundabouts which form the intersections between key roads. Whilst these roundabouts offer generally reasonable amenity for motorised vehicles (I discuss this in more details below), the amenity for pedestrians is poor. Signal

controlled intersections with pedestrian facilities, especially those with short cycle times, raised 'table' intersections, or signal controlled mid-block crossings are safer for all pedestrians, and more convenient for pedestrians with any mobility limitations. In the context of Lower Hutt central city, I consider this includes people pushing strollers, or even those carrying heavy bags, such as shopping.

148. While pedestrian connectivity is provided within the Lower Hutt central city area, the connectivity to the northern side of Hutt River, including to Melling Train Station is not particularly accessible at present. Adjacent to the Lower Hutt central city there are only two river crossings provided for pedestrians, at Melling Link and at Ewen Bridge. The footpaths provided on these two bridges are close to busy roads and the place pedestrians in close proximity to traffic, resulting in a poor crossing experience for pedestrians.

5.7.6 Active transport network

149. A key desire line for active travel is between Melling station and Lower Hutt central city. Figure 8 shows the current route, a distance of some 700m (approx. 9 minutes by foot) which requires crossing several roads. These crossings are not signal controlled and there is no priority to pedestrians or cyclists.

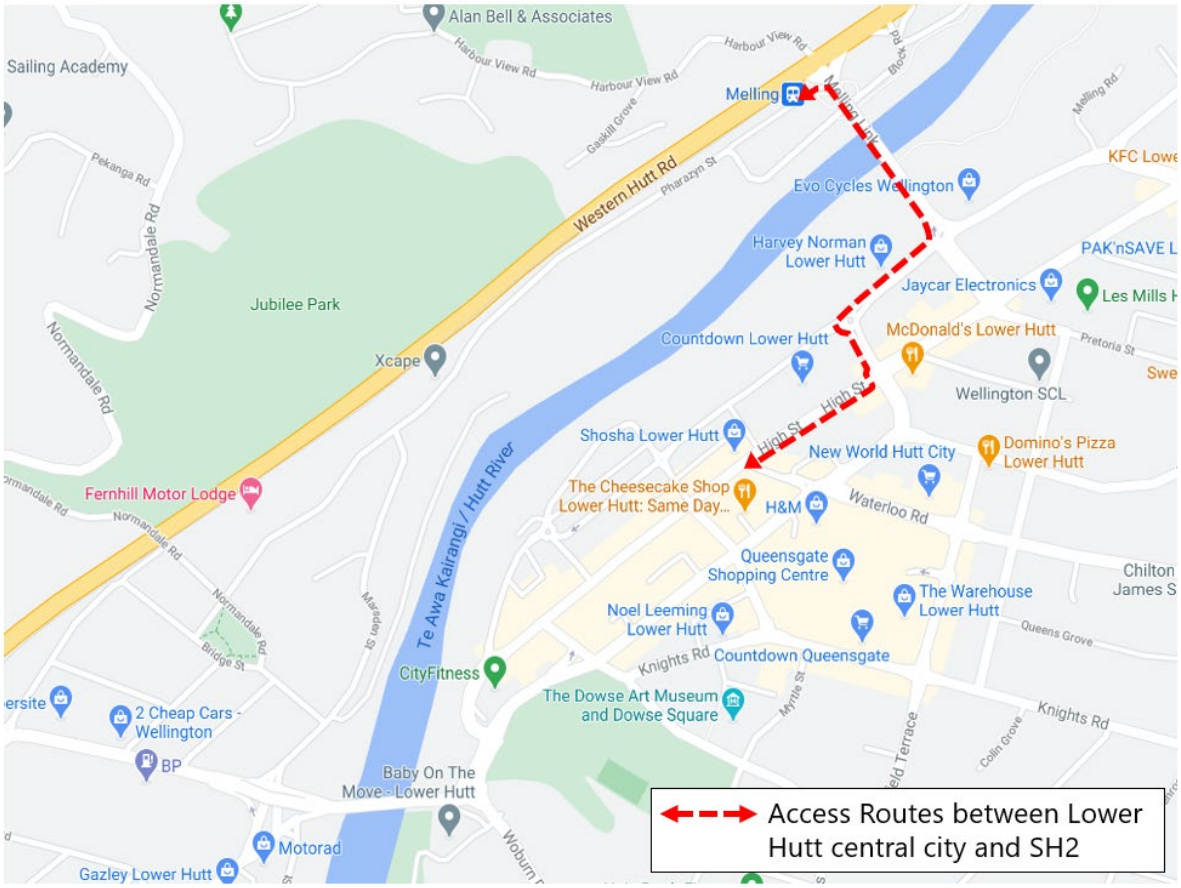


Figure 8 Active transport route between Melling Station and Lower Hutt central city

5.7.7 Safety Environment

150. In order to provide a baseline for the safety of the Project, I have reviewed data from the Crash Analysis System (CAS) database or recorded crashes for the Project area in the 5 years of 2016-2020.

151. Table 1 below shows a summary of the recorded crashes. More detailed descriptions of the crash categories are included as Appendix E.

Table 1 Road crash history

Road name	Total crashes	Fatal	Serious	Minor	Non-injury	Pedestrians and cyclists
SH2 (Lower Hutt Region)	333	1	20	65	247	11
Melling Link	26	0	0	4	22	0
Ewen Bridge	10	0	0	0	10	0
Pharazyn Street	29	0	3	8	18	1
Marsden Street	11	0	1	0	10	0
Pretoria Street	21	0	1	4	16	3
Rutherford Street	28	0	0	3	25	1
High Street	233	0	6	47	180	26
Queens Drive	70	0	5	8	57	8
Daly Street	1	0	0	0	1	0
Bloomfield Terrace	19	0	0	3	16	1
Cornwall Street	17	0	0	4	13	0
Andrews Avenue	0	0	0	0	0	0
Dudley Street	2	0	0	0	2	0

152. The data obtained from CAS suggests that within the urban area of Hutt City the majority of crashes do not result in injuries, and I consider this to be linked to the generally low speed of vehicles arising from the relatively close spacing of the intersections.

153. Despite the low injury count overall, the frequency of crashes involving pedestrians and cyclists is of concern. There is a generally low level of infrastructure provided for vulnerable users, including pedestrians and cyclists at present. The lack of space between active users and road lanes affords minimal options for segregation and protection.

154. At the SH2 Melling interchange, the traffic signal controlled lights on SH2 have demonstrated a propensity to generate nose-tail crashes, where a vehicle crashes into the rear of a stationary vehicle. In addition, there has been one fatal crash involving a turning vehicle at the interchange.

155. I do note that there is a high incidence of crashes where driving with excess alcohol was a factor. Whilst this is not directly connected to the actual road design or operation, the current approach to road safety is to consider a safe system to road design. This means that whilst driver education is a key element, the design of the transport network should minimise the harm that occurs in the event of a crash.

5.8 Parking summary

156. The current Parking provision in the Project area is provided in several different forms. These can be grouped into the following categories:

i. Private parking used by owner/occupiers (eg residential properties)

ii. Private parking which is used by the public (eg Queensgate Mall car-park)

iii. Public off-street parking available for any use (eg Riverbank car park)

iv. Public off-street parking with specific intended purpose (eg Melling Station Park and Ride)

v. Public on-street short term parking (eg P15, P120 spaces) and

vi. Public on-street long term and unrestricted parking (eg P240 or unlimited)

157. The first two categories of private parking provide significant numbers of spaces within the project area. The Queensgate Mall for example has 1,855 spaces available at full capacity. Other such car parks at Countdown and Pak'nSave add hundreds more car parks. However, the total number of car parks is not possible to be quantified, as these spaces are on private land and often under cover and so not visible from aerial photography.

158. Equally, the utilisation of these car parks is not known and I was unable to survey these car parks as part of this assessment. This is quite normal, and the assessment of this scheme is primarily related to the impacts on public car parks. However it is relevant to understand that the parking provided by the public car parking is not fully providing for all car trips, and therefore any changes to the public parking form a small proportion of the total parking capacity.

5.8.1 Parking Surveys

159. In my assessment below I refer to data collected in parking surveys undertaken by Hutt City to ascertain the occupancy of on-street parking in 2014 and 2020 for the central city. The Riverbank car park was also surveyed at this time, but no other off-street public or private parking was surveyed. I include a copy of the most recent 2020 report in Appendix H.

160. The surveys showed that there was minimal difference between the most recent survey and previous surveys, with the parking across the central city peaking at approximately 85% capacity. Whilst there may have been factors that influenced each of the surveys, including the effects of the 2016 earthquake that impacted Queensgate Mall in the 2017 surveys, or the effects of Covid-19 in the November 2020 surveys, I would consider that these surveys provide a robust basis for the consideration of future effects arising from the RiverLink project.

161. My rationale for this view is that the assessment of future long term parking demands has many variables, and the scale of the influence of these factors is smaller than the uncertainties around known and unknown factors such as parking pricing strategy, the availability of alternate modes and behavioural impacts such as increased home or flexible working arrangements.

162. Parking surveys from 2014 ascertained an average peak occupancy of 82% across the public (on and off road) parking available in Lower Hutt central city. A more recent set of surveys undertaken in November 2020, and so potentially impacted by Covid effects, showed a peak occupancy of 85% which occurred between 11am and 1pm.

163. The 2020 parking surveys demonstrated that the average weekday parking occupancy was 71% with a maximum occupancy of 82%. When comparing the total occupancy rates with the on-street parking occupancy rates, it is noted that the on-street parking occupancy is higher (84%) than the total occupancy rate, showing that there is a preference for on-street parking over the use of the Riverbank parking.

164. During the weekday peak, it was noted that 1,975 parking spaces of the available 2,404 spaces were occupied (82% occupancy rate), with a total of 426 parking spaces vacant. During this peak there was an occupancy rate of 84% for the on-street parking spaces and an occupancy rate of 79% for the Riverbank Car Park.

165. The weekend survey demonstrated that the car parking within Lower Hutt has an average occupancy rate of 60% and a maximum occupancy of 82%. It is noted that during the morning, all the on-street parking opportunities nearby the river (Daly St, Dudley St, Rutherford St, High St, Queens Dr, Margaret St, Bunny St, and Andrews Ave) all have an occupancy rate higher than 96%, meaning that during the Market at Riverbank Car Park nearly all spaces in close proximity are occupied during the morning period.

166. During the weekend peak, it was noted that 1,707 parking spaces of the available 2154 spaces were occupied (79% occupancy rate), with a total of 447 parking spaces vacant. During this peak there was an occupancy rate of 81% for the on-street parking spaces and an occupancy rate of 74% for the Riverbank Car Park.

167. I provide a summary of the parking capacity in Table 2 below. I provide detailed assessment of the capacity and utilisation of parking across the project area below.

Table 2 Lower Hutt Central City Parking Capacity Summary

	<P120	P120-P240	All Day	Total
On street Central City	122	1149	309	1580
On street Melling			291	291
Melling Station			187	187
Riverbank Car Park			854	854
City Centre Plaza			336	336
Total	**122**	**1149**	**1977**	**3248**

5.8.2 Melling Park & Ride car park

168. The Melling Station has a car park with a capacity of 187 vehicles for use by rail commuters only during weekday working hours. Observations show this car park to be highly occupied on most days.

169. An additional 21 parks are available on Block Road adjacent to the station. Whilst these are on-street, I have identified them here as they effectively are utilised as additional parking for the station.

5.8.3 Riverbank car park

170. The Riverbank Car Park has approximately 957 car park spaces. Whilst most of the spaces are individually marked, there are some areas where groups of vehicles park where the capacity varies slightly. As such there is no exact capacity for the current car park, but the figure of 957 has been provided by Hutt City Council as being appropriate as the basis of assessment. I consider this a suitable number and noting the total parking stock of central Hutt I consider the variance is inconsequential for my assessment.

171. From the total capacity of the Riverbank car park, 103 spaces are sub-leased to Harvey Norman complex as a part of their resource consent to meet District Plan parking requirements. The car park is closed between 11pm and 6am and there is a flood warning as it is located on the riverside of the stopbank. On Saturdays between 8am and 2:30pm, part of the car park is closed for parking to provide a venue for the weekly outdoor market.

172. The effective capacity of the Riverbank car park for public car parking therefore becomes 854 parks when the Harvey Normal area is excluded. Use of the car park incurs a parking fee, and the duration of the parking is not limited, therefore making the carpark suitable for long and short term visitors.

173. The 2020 survey shows that the Riverbank reaches a peak capacity of 80% (686 of 854) at 11am. The average occupancy throughout the day was 67%. On a Saturday the peak usage was 494 cars, and whilst this could initially be considered to be 58% of capacity, it is recognised that the market uses some of the car park and therefore the actual capacity on a weekend is reduced.

5.8.4 Centre City Plaza car park

174. The Centre City Plaza Car Park building is Lower Hutt central city's only dedicated car park building and is located on Queens Drive. It has 332 car parks available to the public, with no time restrictions. As such it caters for both long and short term paid parking needs. Occupancy data for this car park was not collected in the parking surveys.

175. Current parking options are shown below in Figure 9. This shows the range of different time restrictions and the total number of public parking spaces available. Private parking is additional to that shown and not considered as part of this assessment.

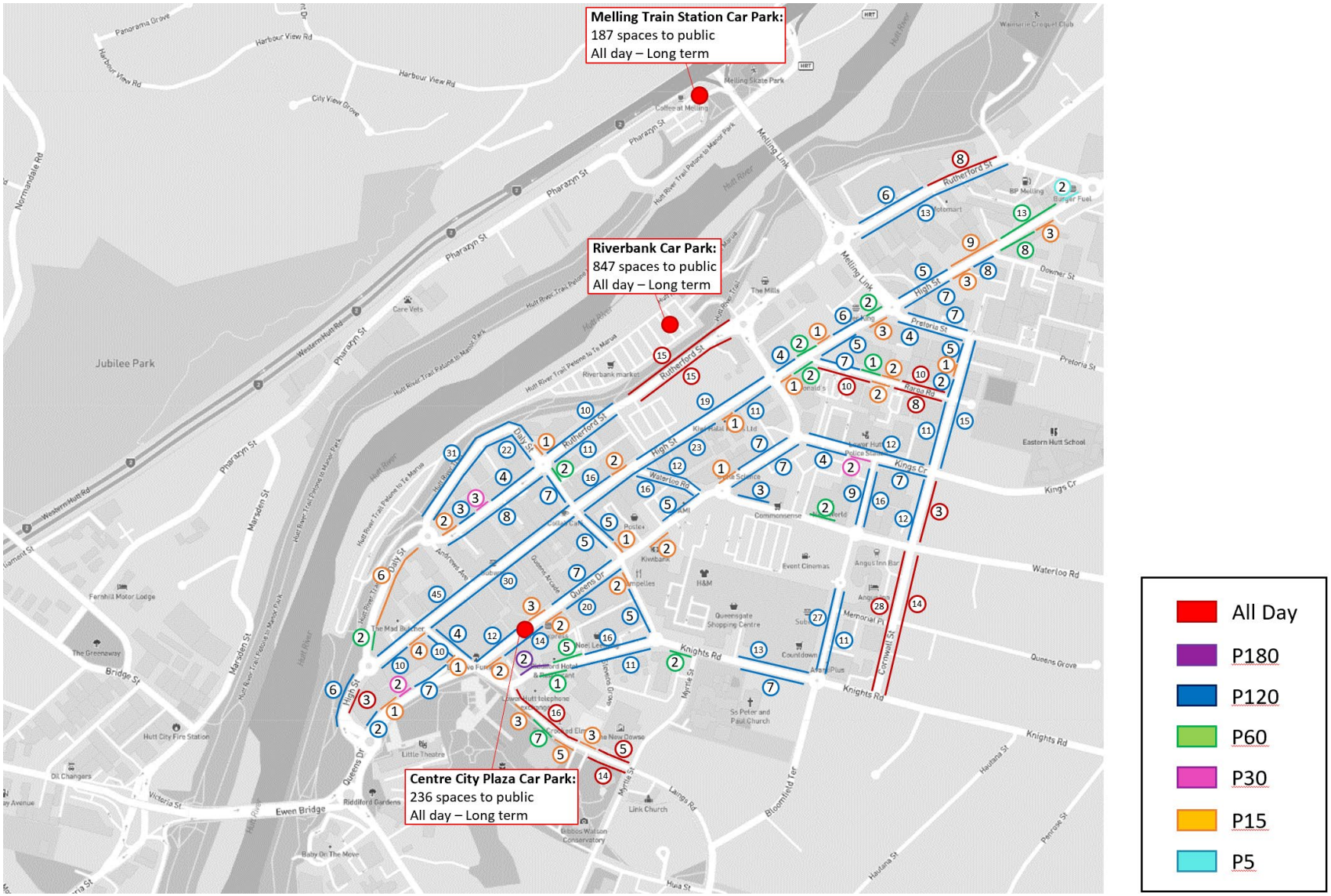


Figure 9 Location and classifications of parking

5.8.5 On-street parking occupancy

176. The figure above shows that on-street parking, and the differing time restrictions are distributed throughout the central city. The data in Appendix H shows that there is a consistency in the utilisation across the parks in the central city.

177. The overall theme is that the parking is at its highest occupancy between 11am and 2pm, with a sharp drop after 2pm. This drop is most pronounced in Laings Road, Knights Road, Myrtle Street and Bloomfield Terrace. These roads have the greatest proportion of short stay spaces. Unsurprisingly, the areas that retain the parking utilisation highest in the afternoon are those with the greater proportion of all day spaces.

5.8.6 Other parking

178. Within the figures above I have not included any assessment of the private parking which is provided on many of the properties in Hutt City. Nor have I accounted for the parking at the Queensgate centre which is privately managed parking for those shopping at the centre. However, I do acknowledge the contribution to the total parking capacity of central Hutt that is provided by these private parks, which I consider will effectively reduce the sensitivity of any changes to the public parking.

6 ASSESSMENT OF OPERATIONAL TRANSPORT EFFECTS

6.1 Transport Mode share

179. The RiverLink project as a combined package provides improvements to all modes of travel to and through the Lower Hutt central city. In addition, the removal of the at grade intersection on SH2 will reduce the delays for through traffic on the state highway. I discuss this specifically and provide the evidence to support this later in my assessment.

180. I consider one of the key positive effects from the project to be the increased integration between modes, specifically between the walking and cycling networks and the access points for both the bus and rail public transport networks.

181. This increased integration will support more people to use public transport for the longer part of their journey, and then complete that by foot, as opposed to using a car to drive to the rail station or for their entire journey.

182. It should be noted that I am not assuming that there would be a total shift in mode for large proportions of people. I expect that in most cases the effect would be that some people change mode some of the time. For example where at present someone drives to the central city each day, as a result of the positive effects of the infrastructure being provided, and assessed in detail below, there may be some days, on a weekly basis that they walk or cycle to town.

183. I note that should a person choose to cycle or walk one day instead of drive to work, that is equivalent to a 20% reduction in the commute trips for a typical full time office employee. I use this purely as an example of how small changes by an individual can cumulatively amount to a more significant overall effect.

184. Noting the very high proportion of Lower Hutt commuters using motor vehicles to commute, a small reduction in the proportion using car would lead to a very significant increase in the number of people walking and cycling. With the motorised commute rate at 73.4% in the last available survey[6], compared to 6.9% for walking and cycling combined, this means that if only half of those currently driving changed to walking or cycling one day a week, the absolute number of pedestrians and cyclists would double.

185. The wider investment in the cycling routes to support longer distance commuters to the north and the south of the project would enable a much wider catchment than the specific networks being proposed within the project would directly facilitate. These routes combine to leverage the potential gains.

186. I am also cognisant that walking and cycling are now only part of the range of active modes which are available, with the recent emergence of e-scooters and e-bikes contributing to an increase in the potential catchment for active modes, both demographically and in range of travel distance.

187. As such I consider that the project will have a significant positive effect on the mode share, as considered in terms of the reduced reliance on motorised vehicles for travel. That is not to suggest that I consider that there will be a reduction in motorised trips, indeed I anticipate and the assessment has allowed for a significant increase in the total motorised trips. However as residential and employment population of Lower Hutt central city grows, those new trips are will be increasingly likely to be made by public transport and active modes.

[6] 2013 Census Journey to work data

6.2 Active transport network

188. The Project includes an extensive network of measures to support the mobility of pedestrians and cyclists in Lower Hutt central city and on the northern bank of the Hutt river. These are shown below in Figure 10.

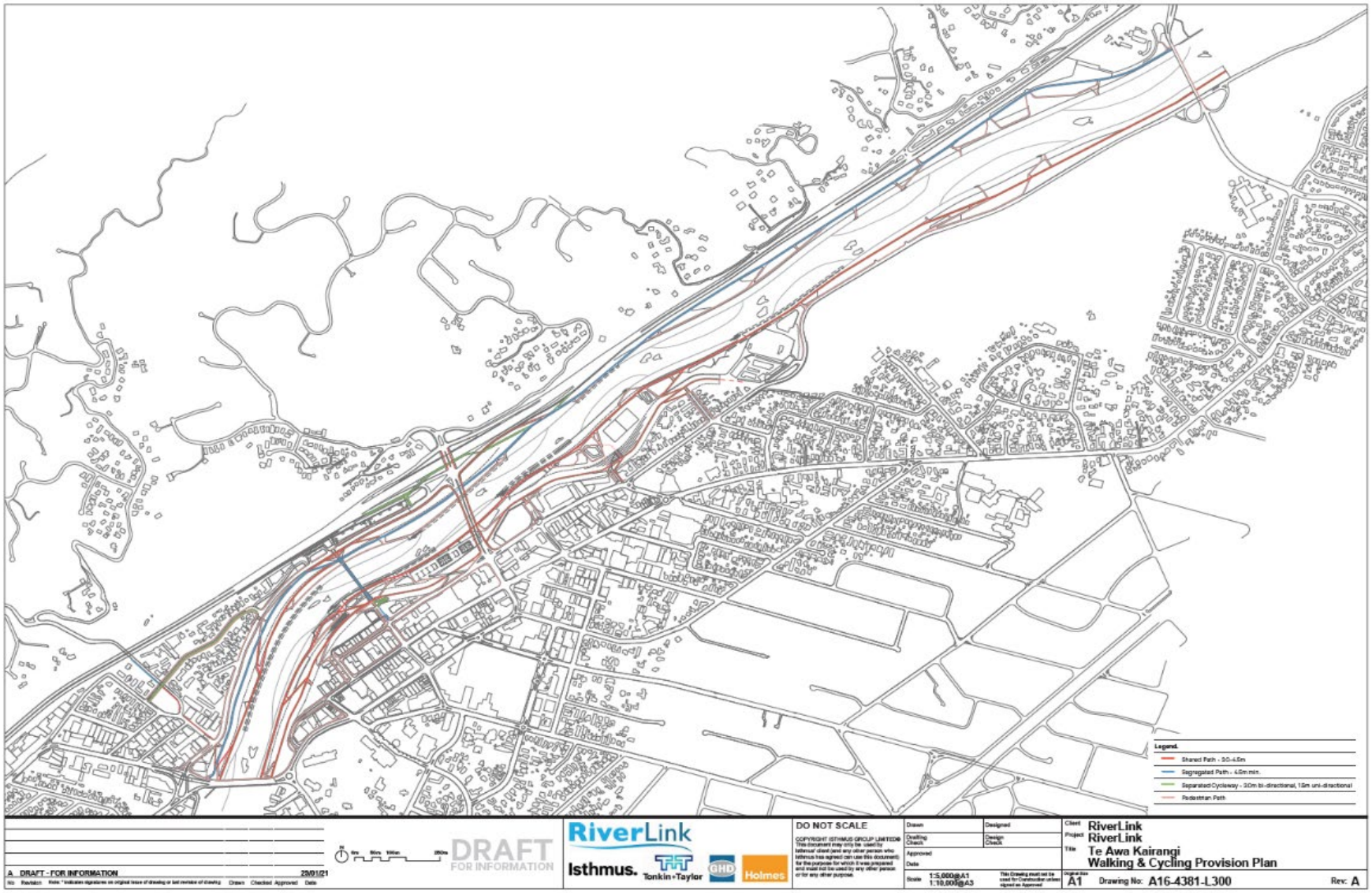


Figure 10 Project active transport network

189. As shown above, the Project provides facilities of several different types, including:-

    i. Shared use

    ii. Footpaths

    iii. Segregated path/bridge (walking and cycling)

    iv. On-road segregated cycle route

    v. On-road (non-segregated) cycling route.

190. In addition, there are facilities to support pedestrians and cyclists crossing roads within Lower Hutt central city, at the Melling Interchange, Marsden Street and Railway Avenue intersection. A mid-block signal controlled crossing will be provided on Pharazyn street to support pedestrian and cycle movements between Melling Station and the pedestrian/cycling bridge.

191. The proposed measures link to existing and proposed routes for active modes in the wider area, as shown in Figure 10. This includes the Hutt River Trail which is a route that primarily serves leisure users but also is used by commuters to Petone and beyond. There is also the proposed cycleway from the relocated Melling train station travelling south alongside the relocated and existing railway tracks to tie into the existing cycle path (the Pito-One to Bridge Street section of Te Ara Tupua) at Bridge Street. It is my view that the commuting use of this trail is likely to increase following the implementation of the Ngauranga to Petone and Petone to Melling components of Te Ara Tupua.

192. The Project network also integrates with the proposed cycle infrastructure to be delivered by Hutt City Council which will improve the connections to Lower Hutt central city for the residents of Fairfield, Waterloo and Waiwhetu. This will be a significant positive effect.

193. A key aspect of the proposals for the Active Travel facilities proposed in the Project is the range of measures that support different users. There is a range of categories of cyclists, and they have differing needs in terms of infrastructure. For example, the facilities to support families with young children riding for leisure purposes would ideally be off-road, away from traffic, and as the speeds of the cyclists would be low, this use could be shared with pedestrians. However, for commute trips, the speed of the cyclists are often higher, the riders favour more direct routes and they are often more confident riders. As such the commuters are comfortable to be on-road, especially in lower speed areas. Segregation of cyclists from pedestrians, including those exercising dogs is beneficial due to the speed differential.

194. Based on my experience and understanding of the network and informed by the community feedback during Project Open Days, our design provides alternate routes that meet the alternate needs of these groups for the main desire lines.

195. I have informed the design of the crossing facilities at the intersections affected by the Project. For each of the active transport journeys I have considered, the proposed crossing facilities at intersections are appropriate to the users, and they will help create a cohesive journey experience to and through Lower Hutt central city.

196. I therefore conclude that overall, the Project will not only be of benefit to the existing active mode users, but it will also be supportive to new users and therefore be conducive in supporting a mode shift from cars to alternate modes. The mode shift will include those accessing Lower Hutt central city to then utilise public transport for longer legs of their journey (such as to Wellington CBD).

6.3 Public transport

6.3.1 Rail

197. A key element of the Project is the new station for the Melling Line. In terms of the effects of rail operations this is outside of my scope. However, in terms of the impact on passenger rail mode choice I consider that the Project will lead to a moderate positive effect overall on rail accessibility.

198. The relocation would move the station closer to the Lower Hutt central city, thereby reducing the time and distance taken for passengers to the central city to complete the journey to their ultimate destination. The proposed and anticipated increases in employment and residential population in the central city in the future will be better served by this location of the station.

199. With the addition of the direct pedestrian and cycle bridge, the safety of this connection is also enhanced. I have assessed that the safety improvements are moderate positive effects when I consider the future increases in passengers.

200. The new location of the station and the construction of the pedestrian and cycle bridge over the Hutt river to the central city decreases the walk distance from 700m to 500m and will also be segregated from traffic for 400m of that distance, and the road crossings would be via pedestrian phases at signal controlled crossings. As such, I have assessed that the effect of the Project is of moderate positive significance.

201. I am aware of the increased walk distance for those travelling from Tirohanga Road and Harbour View which in isolation I consider to be a moderate negative effect of the scheme. However, surveys undertaken for previous phases of the project development showed a very low number of passengers walking to the station from these locations, with those that are using the train more likely to drive to the station. Whilst the pedestrian route still requires three signalled road crossings, the cycle times and the volumes of traffic are reduced compared to the current crossing of SH2 at grade. As such I consider the improved crossing facilities compared to the current environment to partially mitigate the moderate adverse effect to be a minor adverse effect.

202. I consider that this may be related to the steep gradients being a disincentive to walking, especially for the return trip to the residential areas. In the future I expect that there will be an increase in those choosing to utilise electric powered personal mobility (e-bikes/e-scooters), and so although the distance is increased, the improved crossing facilities as a result of the grade separation would more than offset the added distance for these users.

203. I understand from GW that they are planning to establish a new bus route from Tirohanga to Queensgate via the train station, subject to funding and if this were to commence I consider that it would mitigate this moderate negative effect. However, the establishment and operation of a new route is not proposed within the project and the viability has not been established. As such I have not considered this as a proposed mitigation for any adverse effect assessed above.

204. The proposal is to increase the number of stops available for buses to allow rail-bus interchange, and this has the potential to provide significant benefit to a wide population. Additionally, the reduced journey time on SH2 and increased journey time reliability is of particular benefit for any bus services to the new station that serve Upper Hutt and beyond. I consider this to be a significant positive benefit arising from the project.

205. Melling Station is currently the final station on the line, and the new station will remain as such, with all arrivals and departures from the south.

206. I consider the parking effects associated with Melling station later in my assessment. However, in the context of the rail mode, the proposal offers equal parking spaces to that available. In terms of access, the same journey time and journey time reliability benefits would be experienced for those drivers approaching from the Upper Hutt and with safety benefits for those travelling from Western Heights, therefore I consider there to be a slight positive effect on access by car.

6.3.2 Bus

207. Whilst the Project results in changes to many of the intersections in Lower Hutt central city, and it will result in changes to the traffic flows across Lower Hutt central city, the changes have limited direct impact on the routes currently used by buses.

208. Specifically, Route 145, which serves Melling Station and Belmont, is the only route which would need to be amended. The route specifically serves Melling Station, therefore the new station results in a route detour east from the Melling Bridge, via Pharazyn Street, and then back towards Belmont using the new interchange.

209. The proposed new station includes a bus stop and loop within the proposed layout to facilitate this service alteration.

210. The proposed route is required to follow a loop path, without making any additional stops along the loop. This is considered to be less desirable for passengers as it can create the feeling of a longer trip, especially when the bus is not making any stops along the loop. As such, this can cause frustration with the passengers, who are eager to get to their destination as fast as possible.

211. As a bus passenger, the value of time is a top priority such that the reliability of journey time is more important than the journey time itself. For example, if a bus service is meant to have a 15 minute frequency, however it arrives 5 minutes early some days, and 5 minutes late other days, it becomes frustrating for passengers to plan their trip based on an unreliable service.

212. The consequence of unreliable journey time is that passengers have to wait longer for their bus to arrive, or they show up late to their final destination.

213. While the bus services were not explicitly modelled, the improved travel times through Lower Hutt central city and along SH2 can translate directly to an improved journey time and reliability for the bus services, as they travel on the same network. The Project will result in the following improved travel times:

    a. Travel time savings of about 1 minute and 5.5 minutes are predicted for the route from Lower Hutt central city to SH2 north, and about 1.5 minutes and 3 minutes for the route from Lower Hutt central city to SH2 south, in the morning and evening peak periods respectively.

    b. Travel time for inbound traffic towards Lower Hutt central city is predicted to be improved by less than 1 minute, from both SH2 north and south, in both peak period.

214. Additionally, but linked to the above, the project results in changes to the traffic flows on several routes within the Lower Hutt central city that are used by buses. This is particularly within the project area as there are no bus lanes segregating traffic from buses. The changes in traffic are shown below in paragraph 229.

215. The conversion of roundabouts to signal controlled intersections in Lower Hutt central city will increase the reliability of journey times. This is particularly as a result of the change at Ewen Bridge / Queens Drive / Woburn Road.

216. Overall I have assessed that the effect of the Project on bus transport as a moderate positive effect.

6.4 Road network

6.4.1 Traffic flows

217. My assessment of the effects of the Project on traffic flows has relied upon the information contained in the Transport Modelling Report in Appendix A. Further details, and explicit evidence to support the commentary below is contained within that full report.

218. One of the key aspects of the Project is the relocation of the Melling River bridge, with the grade separated SH2 interchange, which directly impacts the traffic flows on SH2 and across the Lower Hutt road network.

219. The Project will result in a significant positive effect on the traffic flows on the SH2, given the traffic flow is uninterrupted with the removal of the at-grade signalised SH2 / Melling Link intersection. The modelling demonstrates that this makes SH2 the more attractive route choice than the local road network of Lower Hutt central city, which results in a diversion of through trips away from Lower Hutt central city onto SH2. This can be seen through the change in traffic flows discussed below.

220. The Project results in the following increases in Average Annual Daily Traffic (AADT)[7] flow on the SH2 (in 2036), which supports my opinion that the SH2 has become a more attractive route choice to passing through Lower Hutt central city:

    a. North of Melling Link interchange: +2,250vpd (+10%) southbound and +2,350 vpd (+14%) northbound

    b. South of Melling Link interchange: +5,300 vpd (+27%) southbound and +2,850 (+15%) vpd northbound

221. The increased traffic flows on SH2 do not have an adverse impact on the performance of the new Melling Link interchange. With the Project, the SIDRA modelling indicated the following Level of Service (LOS)[8]:

    a. AM peak: the north intersection operates at LOS D and south intersection at LOS C, with several movements operating at LOS E, but no movements are predicted to operate at LOS F.

    b. PM peak: both intersections operate at LOS C, with several movements operating at LOS E, but no movements are predicted to operate at LOS F.

222. Noting that this assessment is for a forecast year of 2036, and that the intersections are within an urban area, it is my view that a LOS E would be the lowest appropriate performance I'd expect for design. There are other considerations, including the cycle time, and the ratio of flow to capacity that are also relevant, and whilst not reported in this summary, are reported in the Appendix.

223. I consider the performance of the interchange to be acceptable, with no movements operating worse than LOS E, and the expected queues on the off-ramps able to be stored without effecting the flow on the through lanes of SH2.

[7] AADT flows are used to acknowledge that there are systematic seasonal variations in flows, and variations between weekdays

[8] Level of Service (LOS) for an intersection is a method of categorising the performance according to the least delay for users (LOS A) through to the worst (LOS F).

224. The Project also results in the following changes in AADT traffic flows at the Dowse Drive interchange:

    a. -19% northbound off-ramp supports my opinion that northbound traffic is staying on the SH2, instead of exiting at the Dowse interchange to bypass through lower and central Hutt to travel north.

    b. +35% northbound on-ramp supports my opinion that northbound traffic is merging on the SH2 at the Dowse interchange, instead of bypassing through lower and Lower Hutt central city to travel north.

    c. -20% southbound on ramp supports my opinion that southbound traffic is staying on the SH2 to travel south, instead of bypassing through lower and central Hutt and re-entering the highway at the Dowse interchange.

    d. +117% southbound off-ramp supports my opinion that southbound traffic is staying on the SH2 and exits at the Dowse interchange to access Lower Hutt, Alicetown and Petone areas, instead of passing through Lower Hutt central city.

225. I consider the improved operation on SH2 to have a direct positive effect on the traffic operations across Lower Hutt, since traffic can travel more efficiently along SH2 to destinations beyond the central city, rather than passing through the local roads in Lower Hutt.

226. The Project will result in the following average increases of AADT, which I expect to be directly related to the new connection with the Melling River bridge, and does not have an adverse effect on the local road network when combined with the proposed changes to the local roads as part of the Project.

    a. +38% AADT on the northern end of Queens Drive (Rutherford Street to Margaret Street)

    b. +40% AADT on Kings Crescent (Queens Drive to Pretoria Street)

    c. +11% AADT on Knights Road (Cornwall Street to Laings Road)

227. The Project includes the closure of Daly Street (Rutherford Street to High Street), however I do not believe this to have an adverse impact on the traffic flows across central Hutt. The traffic diverted from Daly Street can be accommodated on other local roads as a result of the change in traffic flows offset by the capacity increase on SH2.

228. The Project includes the conversion of Dudley Street to two-way, which does not have an adverse impact on the traffic flows across Lower Hutt central city. Specifically, the closure of Daly Street and two-way Dudley Street will result in the following intersections operating at LOS A in both peak periods:

    a. Dudley Street/Rutherford Street/Margaret Street intersection

    b. Dudley Street/ Andrews Avenue intersection

229. The Project will result in the following average reductions of AADT along alternative ‘bypass’ routes through Lower Hutt central city between Melling River bridge and Ewen bridge:

    a. -70% AADT along Pretoria Street (Melling Link to Cornwall Street)

    b. -39% AADT on Cornwall Street

    c. -22% AADT on the southern end of Queens Drive (Margaret Street to Ewen Bridge)

    d. -24% AADT on Ewen bridge

    e. -18% AADT on Rutherford Street (Melling Link to Margaret Street)

f. -57% AADT on High Street (Daly Street to southern Queens Drive)

g. -30% AADT on High Street (northern Queens Drive to Andrews Avenue)

230. I expect that the traffic flow decreases stated above are directly related to the improved traffic conditions on SH2, and traffic is choosing to use the State Highway for journeys without local origin or destinations which is a more appropriate route according to the roads hierarchy.

231. With the Project, I consider the performance (LOS) of the following intersections to be acceptable:

a. Rutherford Street / Melling Link (Old bridge landing): LOS B

b. High Street / Melling Link: LOS C

c. New Melling Bridge landing/ Rutherford Street/ Queens Drive: LOS D, with the worst movement operating at LOS E

d. High Street/ Queens Drive: LOS D

e. Ewen Bridge/ Queens Drive: LOS C

232. Overall, I have assessed that the change in traffic flows on SH2 and across Lower Hutt central city have a positive effect on the transport accessibility and efficiency on the SH2 and Lower Hutt.

233. Table 3 shows the AADT traffic flow changes (+/-) for 2036 Do Minimum and with the Project. Figure 11 illustrates the traffic flow changes (%) from the key route diversions associated with the Project.

Table 3 2036 AADT traffic flows for Do Minimum and with the Project (vehicles per day)

Road	Section	2036 Do Min	2036 Project	Difference
Melling Bridge	Both directions	24,450	31,500	+7,050
Tirohanga Road	Both directions	1,850	1,650	-200
State Highway 2 (southbound)	North of Melling Link	25,750	28,200	+2,450
	Melling Link - Normandale Road	22,900	28,800	+5,900
State Highway 2 (northbound)	North of Melling Link	23,350	25,850	+2,500
	Melling Link - Normandale Road	27,500	30,900	+3,400
Rutherford Street	Pretoria Street - Queens Drive	17,650	14,650	-3,000
	Queens Drive - Margaret Street	11,650	9,850	-1,800
High Street	North of Pretoria Street	5,500	4,500	-1,000
	Raroa Road - Queens Drive	4,650	5,500	+850
Queens Drive	Rutherford Street - High Street	8,200	14,050	+5,850
	Waterloo Road - Margaret Street	4,950	6,150	+1,200
Daly Street	Rutherford Street - Andrews Avenue	6,050	n/a	n/a
Dudley Street	Margaret Street - Andrews Avenue (westbound)	8,250	3,000	-5,250
	Andrew Avenue - Margaret Street (eastbound)	n/a	1,300	n/a

Road	Section	2036 Do Min	2036 Project	Difference
Margaret Street	Dudley Street - High Street	1,650	2,600	+950
	High Street - Queens Drive	200	1,500	+1,300
Knights Road	Bloomfield Terrace - Cornwall Street	13,750	13,700	-50
Laings Road	Queens Drive - Myrtle Street	1,250	1,900	+650
Woburn Road	Queens Drive - Myrtle Street	19,350	17,550	-1,800
Ewen Bridge	Both directions	44,950	34,000	-10,950
Railway Avenue	Aglionby Street - Herbert Street	23,400	18,550	-4,850
Marsden Street	Bridge Street - Pharazyn Street	5,000	3,500	-1,500
Pharazyn Street	Bridge Street - Marsden Street	2,350	3,200	+850
	Marsden Street - Block Road	6,950	6,350	-600
State Highway 2 Interchange	Between on and off ramp	n/a	20,600	n/a

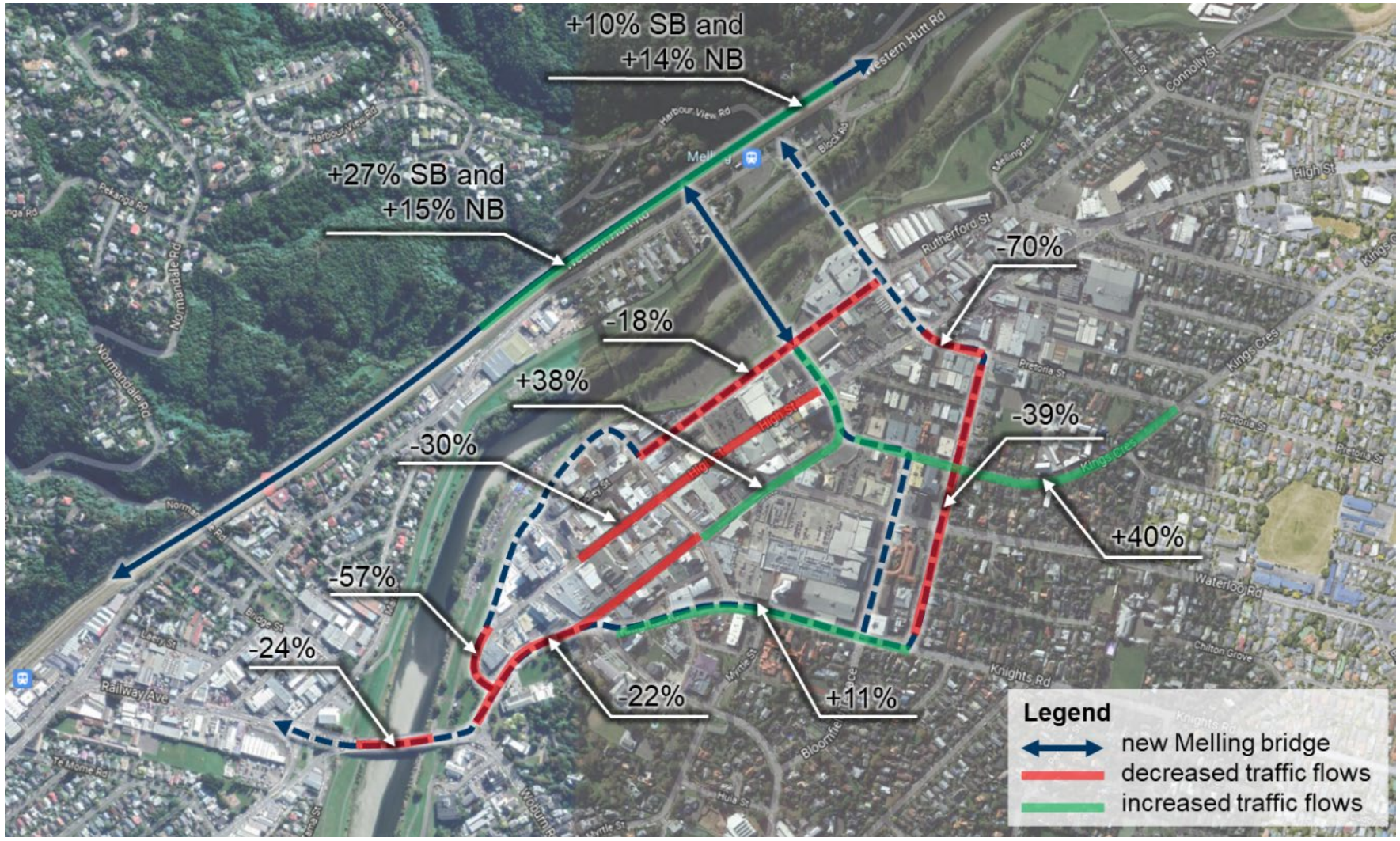


Figure 11 2036 AADT traffic flow changes (%) with the Project (key routes)

6.4.2 Travel time and Reliability

234. The Project will result in the following improved travel times through Lower Hutt central city and along SH2:

a. Travel time savings of about 1 minute and 5.5 minutes are predicted for the route from Lower Hutt central city to SH2 north, and about 1.5 minutes and 3 minutes for the route from Lower Hutt central city to SH2 south, in the morning and evening peak periods respectively.

b. the travel time for inbound traffic towards Lower Hutt central city is predicted to be improved by less than 1 minute, from both SH2 north and south, in both peak period

6.4.3 Freight effects

235. The reduction in journey time and the improvements to journey time reliability are the key benefits to freight movements from the project. These benefits I would classify as moderate benefits in the context of the overall journey times and network.

236. The proposed changes to the road network within Lower Hutt central city are unlikely to result in significant effects for freight movements, as they would only affect those movements with an origin or destination within the central city.

237. However, I do note that the realignment of the Melling bridge to land at Queens Drive, and the conversion of the roundabouts to traffic signals will impact the route required to access some businesses to the east of the central city. In this respect there may be some minor adverse effects for freight movements. I have identified this specifically due to the reduced manoeuvrability of freight vehicles compared to general traffic. This limited adverse effect does not change my rating for the overall effects on freight.

238. Individual property access is discussed later in my assessment, and the project is assessed to have a significant adverse effect for access for one property.

6.5 Parking

239. The changes to parking availability are summarised in Table 4 below.

Table 4 Changes to Parking

Location	Spaces Removed	Spaces Replaced	Difference
Public Car Park			
Mills Street	12	0	**-12**
Melling Station Park & Ride	187	201	**14**
Block Road	21	0	**-21**
Pharazyn Street	130	34	**-96**
Marsden Street (On-street)	38	83	**45**
Riverbank Car Park (Excluding Leased to Harvey Norman)	854	420	**-434**
Daly Street	62	0	**-62**
Dudley Street	18	0	**-18**
High Street	8	0	**-8**
Rutherford Street	4	0	**-4**
Queens Drive	2	0	**-2**

	Public Spaces Removed	Public Spaces Added	Public Spaces Loss
Public Car Park Total	**1336**	**738**	**-598**
Private Car Park			
Harvey Norman	103	0	-103
Hutt City Church Car Park	40	30	-10
	Private Spaces Removed	**Private Spaces Added**	**Private Spaces Loss**
Private Car Park Total	**143**	**30**	**-113**
Grand Total	**1479**	**768**	**-711**
	Total Spaces Removed	**Total Spaces Added**	**Total Loss**

240. The table above does not include any temporary parking which is to be made available on the development sites prior to their construction. I understand that these sites could provide some 150 additional temporary parking spaces, and this is to be part of the transitional parking strategy. As such, in the short term the reduction in parking would be a loss of 531 parking spaces.

241. In Table 2 I showed that there are currently 3,248 public car parks in the project area, a figure that excludes private parking which I believe to be exceed that amount. This results in the reduction of public parking being a 17.5% reduction in the long term, and 13% when the 150 temporary car parks are taken into account. These figures exclude the loss of the private parking for Harvey Norman and the reduced capacity at the carpark adjacent to the Hutt City Church.

6.5.1 Melling parking

242. The project will result in a decrease in the parking spaces available in the Melling area of the project of 28 public spaces. This decrease in available parking arises from the changes to the alignment of Marsden Street allowing parking on both sides of the road instead of just the one side at present, but offset by the reduction in parking on Pharazyn Street near to the new station.

243. As a result of these changes, accounting for approximately 5% of the public parking in the Melling Area of the project I consider the effect to be negligible. I base this view on the small proportional change coupled with the increased accessibility by other modes in this area, and the specific provision of parking for key destinations such as the new rail station, the Hutt City Church, and the provision of the service lane with parking for the Pharazyn Street commercial premises.

6.5.2 Central City parking

244. Table 5 below summarises the existing parking supply with comparison to the proposed parking conditions, specifying the parking spaces as long-term spaces or short-term spaces.

Table 5 Proposed Central City Parking Changes

Parking Type	Existing Environment	Proposed Environment	Net Change
All Day	1,499 spaces	882 spaces	-617 spaces
P240 or less	1,149 spaces	1,055 spaces	-94 spaces

Parking Type	Existing Environment	Proposed Environment	Net Change
Total	2,770 spaces	1,937 spaces	-711 spaces

As shown by the table above, the removal of car parking spaces will have a more significant effect on the long term parking space availability when compared with the reduction in short-term parking spaces.

245. It is noted that majority of the long-term parking spaces that are proposed to be removed are located within the Riverbank Car Park (434 spaces to be lost) and where other spaces are proposed to be removed these spaces are replaced with new parking spaces nearby.

246. The majority of short term parking spaces being removed from the study area are located along Daly Street; 62 of the 94 parking spaces being lost are located here.

247. The potential adverse effects I would expect include localised obstructions where drivers wishing to load/unload or make short stops park outside of marked areas, obstructing footpaths, driveways or within a traffic lane. If they were to arise, these would be moderate adverse effects.

248. For commuters, I would expect there to be a displacement effect where some drivers choose to park further from town, in locations where parking is available, and walk into the central city from there. I consider the magnitude of reduced parking could have the potential to have a significant impact on commuter access to Lower Hutt central city if there are no mitigations applied.

249. I take the view that beyond a 15 minute walk time, there are likely to be negligible effects on parking access in the residential street network. I applied this distance due to a wide personal and industry experience of traveller behaviours that show a marked drop in the proportion of people likely to walk further than this, and also as a secondary factor that the area covered by any longer distance travel is dispersed over a wider radius reducing the effects.

250. For residential streets within this 15-minute walking catchment, I consider that this displacement could potentially reach Penrose Street to the south, and the roads north of Witako Street to the east of the central city. I have shown this in Figure 12 below. The area shown includes areas further than 15 minute walk distance, as I have allowed for current on street parking for destinations to the south of the central city being displaced further away by parked commuters in the central city.

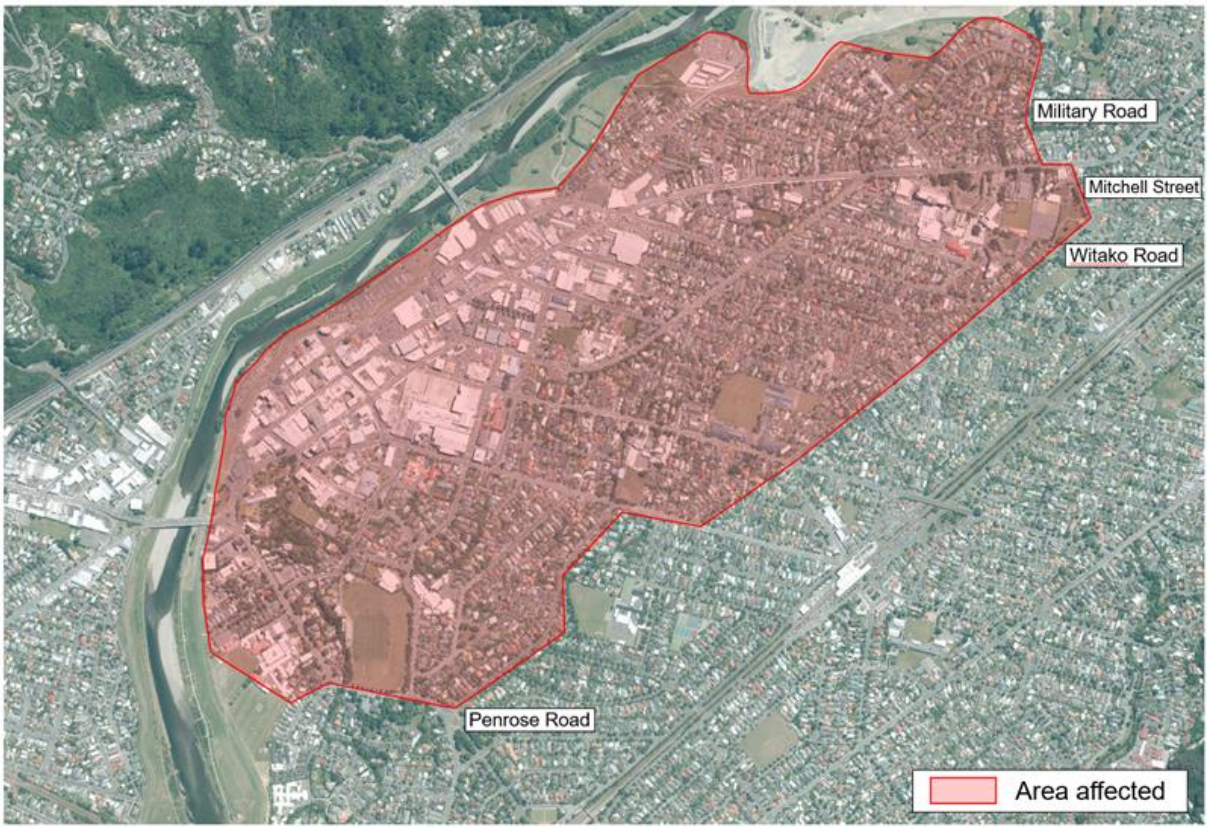


Figure 12 - Parking area of influence

251. There are already some parking restrictions on some of the roads in the zone identified, including ‘P120’ that deters commuter parking whilst allowing for on road parking from visitors. These restrictions are in place on the roads closer to the Central City, but further out in the zone I’ve identified are unrestricted. The general housing typologies of the residential areas within the area identified include off road parking.

252. If parking restrictions are not extended, and unrestricted commuter parking is allowed to occur in the streets, I consider there is the potential for a moderate adverse effect. This rating is a result of my consideration that a portion of the residents would arrive back on an evening after commuters have vacated the parks, as evidenced by the data showing the occupancy per hour in the Hutt City Parking surveys. The adverse effects are therefore for daytime weekday visitor parking, and those who return home during the day, who may be reliant on off street parking.

253. Whilst I am not able to predict the outcome of the Parking Policy Review being undertaken by Hutt City Council, nor the Transitional Parking Plan that I discussed earlier, I would expect it likely that extending the extent of these restrictions across the area shown would be considered in both reviews. In this case there would be a minor adverse effect on the residents of those streets, which may not be attributed to the Project directly as a result of being unable to park all day on street. Residents for example would have to park vehicles in garages or driveways.

254. Other effects are increased congestion as a result of drivers attempting to find a free space who circulate around the Lower Hutt central city area. This effect is mainly associated with short stay trip types, and as shown above there is limited effect on these parks, subject to any reallocation of spaces.

255. The final effect is that there may be some trip suppression or diversion as people decide not to come to Lower Hutt, and either travel elsewhere or do not make discretionary trips.

256. I do expect that there would be some people who would make a decision to swap to alternate transport modes. However these modal shifts would need to be supported by positive measures. The Project does provide some of these measures in the form of improved accessibility by foot, cycle and rail from the new Melling Station via the pedestrian and cycle bridge. This can be supported by enhancements to the bus and rail service frequency and the times of operation to provide greater opportunities for some people to choose not to drive and park.

257. The ability to swap modes is most likely to be feasible for those who are commuting, and that matches the current allocation of the lost spaces to mainly be long term parking. Commuters make regular journeys, and therefore are more likely to know, or learn, the appropriate public transport route and timings to access the central city. They are also potentially more able to walk or cycle to work, at least some days of the week. And this when aggregated over multiple users provides a reduction in the parking demand on any day and across the week.

258. I note that the majority of the proposed parking reduction is from the Riverbank car park which is not fully available on Saturdays when the market is operating, and accommodates low demands on Sundays. As such I consider the effects of the parking reduction are significantly reduced on the weekends, compared to Monday to Friday.

259. As I discuss later in the mitigation section, the reduction in overall parking numbers is less relevant to the specific reduction in the number of spaces that are allocated for long term parking or short term parking. This is because someone will have a need for either all day parking, or short term parking, and their need for one type of parking cannot generally be replaced by a space in the other type. As such, the impact on any particular journey type will be dependent on the management of the 2,567 public parking spaces that will remain in the Project Area following the implementation of the Project.

260. Although I have assessed the overall changes in parking, I have also assessed the localised impacts on parking in different sections of the Project area. This more specific assessment recognises that there are occasions where parking demand can be very locally focussed; such as when carrying large or weighty goods between businesses and vehicles.

6.5.3 Riverbank car park

261. The reduction in the scale of the Riverbank car park is the most significant impact on parking arising from the Project. The effect will be to reduce the public parking from approximately 854 vehicles to 420 vehicles. This represents some 10% of the public parking spaces in Lower Hutt central city.

262. Specifically this car park provides the main facility for all day parking, with no time limit, which results in the impact being greatest on commuters wishing to stay all day, because alternative on-street parking is time limited.

263. I expect that the reduction in the parking capacity of the Riverbank car park will influence the traffic patterns in central Hutt, removing some of the demand along Rutherford Street.

264. The retention of 420 car parks on the Riverbank does retain a large number of spaces in a similar location, which does facilitate parking for some of the current users that have a specific need for parking in this location. I consider this provides for the location specific parking, but does still leave a residual significant effect on the total quantum of parking in central Hutt.

6.5.4 Removal of Harvey Norman leased spaces

265. The 103 car parks currently leased by Harvey Norman are dedicated for staff parking. Additional parking for shoppers is provided within the building, accessed via Rutherford Street.

266. The effects of the loss of this parking will not directly impact the ability of the store to operate, however it will have an adverse effect on the Harvey Norman employees. This effect is likely to be increased distance to walk between parking and the store, and increased costs if utilising paid parking elsewhere, including in the reduced Riverbank parking area.

267. Noting that the effects of removal of these leased spaces are specific to the employees of Harvey Norman, I have considered the effect not as a reduction in public parking, but as an increase in the demand for public parking (because some of the Harvey Norman employees currently utilising these 103 spaces will use public spaces in the future).

268. However, I consider that the response to the removal of this option for staff parking is likely to result in a mode change towards walking, cycling and public transport for some staff, at least on some days. Overall, I have assessed that the effect of the Project from the removal of the leased parking area to be a minor adverse effect.

6.5.5 Melling Station car park

269. The proposals for parking at the new station result in a slight increase in spaces within the park and ride, although the loss of the adjacent on street parking reduces the total parking slightly. As such I consider there to be a negligible effect on parking as a result of the Project. The currently available parking is replaced with an almost equal number of parks, at an equivalent location from the relocated station.

6.5.6 On-street Parking

270. It is noted that the reduction in on-street parking (short-term spaces) equates to approximately 5% of the total provision of short-term parking spaces within the area. The surveys undertaken in 2020 demonstrated a maximum occupancy rate of 84% during the weekday and 81% on the weekend. It is expected that removing 5% of the parking supply would make finding a space more difficult, however there will still be vacant parking spaces available for short-term use.

6.5.7 Daly Street closure

271. A total of 62 on-street car parks on Daly Street will be removed after the proposed road closure, which will also remove the through traffic that may be circulating looking for parking.

272. In the long term the development opportunities that arise from the Riverlink Project would need to consider the access and need for off street parking in the adjacent areas.

6.5.8 Fraser Street (southern High Street)

273. The changes to the road layout at the southern end of High Street result in the removal of 8 on street P120 car parks on Fraser Street. Other parking spaces immediately adjacent on High Street will remain and so whilst this does reduce the parking immediately adjacent to the building currently operating as a gym, alternatives exist which provide the required amenity.

274. I note that the two disabled parking spaces are not impacted by the Project.

275. I would therefore consider the effects to be minor in this location.

6.5.9 Dudley Street

276. Removal of 18 on-street car parks on Dudley Street facilitates an improved environment for pedestrian access through wider footpaths. The reduction in kerbside parking on Dudley Street will make the availability of parking immediately adjacent to premises less likely. However this is offset by the improved ability to walk along Dudley Street, thereby supporting those that are visiting multiple destinations.

277. The number of people that I would expect to arrive in 18 vehicles is a small proportion of the existing, and future, visitors to the premises that front Dudley Street, suggesting that the majority of those active in the street are currently arriving in the locale by other means than using these parking bays. As such I would consider the direct effect to be moderate.

278. However, noting the mix of restrictions on the parking of Dudley Street at the moment, I would consider that a review of the restrictions to provide an appropriate balance across the retained spaces in the future would be appropriate.

6.5.10 Pharazyn Street

279. The realignment of Pharazyn Street results in the removal of 138 existing on-street car parks. However the realignment facilitates the provision of 68 on-street car parks on the new road, and the Project requires the land and consequential removal of several commercial properties that currently generate parking demand.

280. The relocation of the Rail station adds an additional demand to the parking in this location, and therefore I expect that there will be a demand for parking above the capacity which would require restrictions and monitoring to prevent significant adverse effects for local properties.

281. I also consider that the provision of the new pedestrian and cycle bridge could further increase the demand for parking on Pharazyn Street by people wanting to ultimately access central Hutt.

282. As a result the potential for adverse effects on the frontage properties is high in this location as a result of the proposed changes to parking associated with the Project. .

6.5.11 Marsden Street

283. The changes to the road alignment of Marsden Street will necessitate the removal of 38 on-street car parks on the existing alignment, with 83 on-street car parks provided on the re-aligned Marsden Street.

284. I would not consider the loss of 9 spaces considering the overall availability of on-street parking to be significant in general. However, I am aware of the presence of a church on the corner of Marsden Street and Victoria Street, and understand that for services the congregation does utilise these on-street cart parks, and as such I expect this to have two effects. Firstly, it will increase the radius of the effects of the church services as the parking radiates out from the church. Secondly, the loss of parking will also increase the distances that some of the congregation would need to walk.

285. However, it is my view that this is a relatively minor effect, noting the loss of parks is only for 9 vehicles, and therefore overall this is a minor effect. I do note that the Project does deliver enhanced walking facilities, and specifically crossing facilities at the intersection with Victoria Street will make it safer and easier to access the Church site by foot.

6.5.12 Block Road

286. The removal of Block Road is expected to remove a total of 21 parking spaces and as Block Road is to be removed, these parking spaces are not proposed to be replaced.

287. I would not consider the loss of 21 spaces considering the overall availability of on-street parking to be significant noting that the demand for these parks is associated with the station that will no longer be adjacent to Block Road.

6.6 Property access

6.6.1 Pharazyn Street

288. For the re-configuration of Pharazyn Street, a one way service lane is proposed to maintain access for surrounding residential properties. With this design, I consider that the effect of the Project on property access from Pharazyn Street will be minor. Parking and loading will still be available adjacent to the properties, and access will be through a very small detour on approach or exit due to the one way nature.

6.6.2 Marsden Street

289. Re-alignment of Marsden Street closes the existing connection to the off-road shared path running parallel with Hutt River, but a new connection is proposed to ensure access.

290. Parts of the existing properties on the eastern side of Marsden Street are to be demolished and replaced with the proposed stop bank. But the western side of Marsden Street is to provide access for surrounding residential properties.

291. A pedestrian crossing is to be installed at the northern end of Marsden Street, connecting two shared paths.

292. I consider the property access effects to be negligible for the retained properties.

6.6.3 Daly Street (north)

293. Existing northern Daly Street is to be closed and existing properties are to be demolished.. The new walking promenade together with the stairs and ramps proposed on west of Daly Street between Margaret Street and Andrews Avenue will provide access for pedestrians and cyclists. The new design provides increased access to economic and social opportunities.

294. The proposed demolition of properties renders an assessment of the access effects here redundant.

6.6.4 Daly Street (south)

295. Existing southern Daly Street is to be closed and existing properties are to be demolished. Pedestrians and cyclists are to use the stairs and ramps mentioned above to access between city and the promenade.

296. The proposed demolition of properties renders an assessment of the access effects here redundant.

6.6.5 Queens Drive

297. The proposed retaining walls and batters between 0.2m and 4.3m in height along Queens Drive and Rutherford Street minimises the bridge landing impacts on private property, but it will block vehicle access and egress at the southern end of Brockelsby Roofing Products factory. On occasion, trucks are currently understood to reverse into the site for loading and unloading.

298. Figure 13 and Figure 14 show the alternative routes considered for to preserve access and maintain factory operations. The tracking curves show B-train manoeuvring.

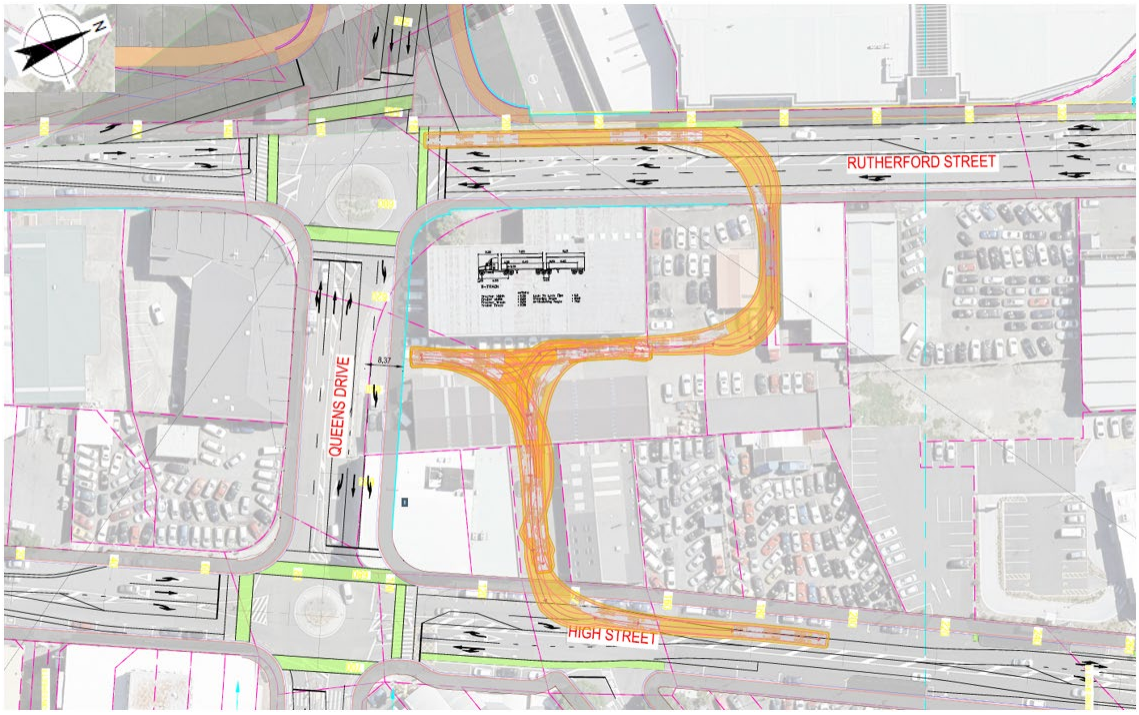


Figure 13 Alternative route 1

299. Figure 13 shows B-train accessing from Rutherford Street, and unloading in a north-east facing direction. The movement for B-train type truck and trailers is described below.

i. Truck enters by turning right from Rutherford Street into the lane-way perpendicular to Rutherford Street

ii. It then turns left into the lane departing on High Street (currently between two properties)

iii. The truck then reserves into the loading zone and requires completing a straightening out manoeuvre in the lane-way. It will then be loaded / unloaded

iv. The truck can then depart from the loading zone to High Street, and

v. One car park adjacent to the exit lane will need to be removed as the b-train tracks through this car park in order to remain within its carriageway and not impede on-coming traffic.

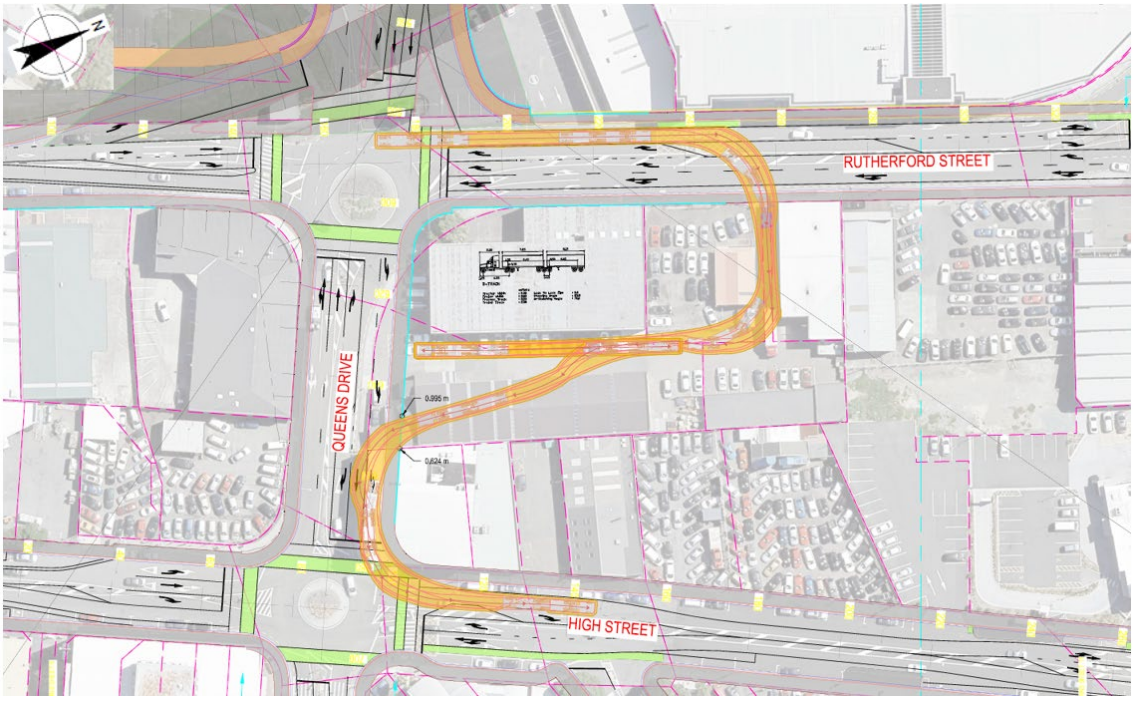


Figure 14 Alternative route 2

300. Figure 14 shows the B-train accessing from Rutherford Street, and unloading in a south-west facing direction. The movement for B-train type truck and trailers is described below.

    i. Truck enters by turning right from Rutherford Street into the lane-way perpendicular to Rutherford Street

    ii. It then turns left and drives straight into the loading zone to unload, and

    iii. The truck then reserves straight and exits adjacent to the building on the southwestern corner. To achieve this, a new ramp would be required constructed onto the raised Queens Drive. Retaining wall heights at this new exist are measured to be from 1.0m to 0.6m. To exit this new ramp onto the raised Queens Drive, the truck will require reversing to egress on an angle. This is not generally considered appropriate as trucks departing on a sloping angle have and elevated risk of tipping.

301. As a result of this assessment I consider that the proposed changes to Queens Drive will result in a significant effect on the access for the Brockelsby Roofing products site. However, I also note that the current operations are not suited to an urban area, as they already create a safety risk to pedestrians, cyclists and other road users.

302. The network changes will lead to an increase in vehicles on Queens Drive, and this becomes a key walking and cycling route. These changes would conflict with the current access operations regardless of the need to create a retaining wall.

303. I am also concerned with the safety and efficiency of the turn into the site from Rutherford Street across three lanes of traffic approaching the signalled intersection. This is likely to lead to blocking of Rutherford Street due to the queues of vehicles on the approach to the stop line.

304. I understand that discussions are ongoing between parties with an interest in the site, and these may lead to revised operations within the site and/or tenant relocation which could address this issue. The issue would appear to have arisen as a result of the size of vehicle needed to serve the operations of the tenant. The site is zoned for commercial activities, and these would generally not require servicing by B-train trucks. The current tenant is a

manufacturer of roofing products and has servicing needs which are more akin to those expected from an industrial land-use.

6.6.6 Rutherford Street

305. The location and height of the landing of the new Melling road bridge is such that the vertical alignment of Rutherford St is required to be raised by approximately 3m to connect the bridge surface with the local road network. This results in impacts on the adjacent properties.

306. This effects the access to PetVet at 53 Rutherford Street, where a new ramped access is required. Retaining walls across the property frontage will result in changes to the pedestrian and vehicle access into and out of PetVet. At the time of production of this report, details of these changes are yet to be discussed and agreed with the property owner. This has the potential to be a significant adverse effect for the property.

307. The retaining walls and batters along upper Rutherford Street terminate before the existing Brockelsby Roofing Products factory access point at 49 Rutherford Street. Delivery trucks will still use the same access on Rutherford Street to access the factory. However, as noted above, the ability to turn into this entrance across queuing traffic will be constrained and not desirable. Egress would however be largely unaffected.

308. I understand that access to the site from Rutherford Street is currently an extremely difficult manoeuvre and causes some disruption to the efficient movement of general traffic. Following construction ogf the Project the increased flows on Rutherford Street will accentuate this issue.

6.7 Safety

6.7.1 Melling Interchange

309. I have used the methodology in the Waka Kotahi High Risk Intersection Guide (HRIG) to quantitively predict the frequency of crashes at the Melling interchange in the future. This approach uses the forecast traffic flows along with data on the road layout and data from similar intersections in New Zealand to create an estimated crash rate per year. Details of the assessment are contained in Appendix H.

310. I note that the project will provide a single grade separated intersection which replaces two at grade signalled intersections on SH2, at Melling Interchange and Block Road. Whilst there will still be two sets of traffic lights on that overbridge, the majority of the traffic will flow under that interchange unimpeded by turning traffic and therefore the majority of the potential conflicts between vehicles are removed.

311. The current at-grade intersection has an observed injury crash-rate of four per year and is classed as a high collective risk with high personal risk. The intersection has a recorded crash record that classifies it in the worst 10% of intersections in the country for frequency of crashes resulting in personal injury.

312. The model estimates that the with the grade separation the crash rate would reduce to 0.31 per year. This assessment is a result of combining the predicted crash rates for the two sets of signals, each assessed separately for conflicts and potential crashes. I consider that this is a significant positive effect on safety. I consider that the reduction in the frequency of crashes is significant, but that the removal of the potential for the high speed crashes between through traffic on SH2 and turning traffic is especially significant in reducing the potential for crashes that result in serious or fatal injuries.

313. Although the numbers are low, the overbridge also separates the most vulnerable users, pedestrians and cyclists, from the high volume and potentially high speed through traffic. I am mindful of the potential conflict between traffic on the off ramps and pedestrians and cyclists crossing at the facilities provided but consider this is no higher risk than the current, and with the appropriate design details will be well managed and mitigated. The process of independent safety audits and reviews during the detailed design is the mechanism to ensure the validity of my assessment in this respect.

6.7.2 Access to Melling Station

314. The existing cycling route adjacent to the new Melling Station is not fully segregated, which results in cyclist riding on-road in order to access the new shared paths along Hutt River or adjacent to SH2.

315. The new station location will be served with a range of on and off-road cycle facilities, and with the active mode bridge to central Hutt, I consider that this will make access to Melling Station significantly safer, and therefore is a significant positive effect of the project.

316. Access from the north of SH2 will still require crossing traffic on the ramps to SH2, but this traffic will be at lower speed, and the cycle and pedestrian crossings will be signal controlled.

6.7.3 Lower Hutt Central City

317. I consider the safety effects of the Project through Lower Hutt central city are associated with two key factors, both of which result in positive effects.

318. Firstly, the changes to the SH2 Melling intersection are discussed above to result in a reduction of traffic through Hutt, with more traffic remaining on SH2. This reduces the traffic that is on roads where high numbers of pedestrians and cyclists are crossing and travelling, which reduces the risk to vulnerable road users. I consider this to offer a minor positive effect from the Project.

319. However, a more significant positive safety effect comes from the provision of the extensive network of segregated paths for pedestrians and cyclists across the network. This is complemented by on-road cycling facilities that benefit the more confident cyclists that are likely to use these routes.

320. My assessment has assumed that the networks connect to appropriate facilities outside of the Project which are to be provided by Hutt City Council. If these facilities are not provided there is the potential for adverse effects as cyclists are focused onto routes in the Project through Lower Hutt but then are placed onto unsuitable routes without transition on as they enter the wider area.

321. I also consider that the proposed changes from roundabouts to traffic signals for the intersections in Lower Hutt will lead to an overall positive effect on safety.

322. The Waka Kotahi safe system approach to intersection design would generally favour roundabouts over traffic signals as they have fewer casualty crashes involving motor vehicles than other intersection forms. When crashes do occur, for motorised vehicle users the severity of injuries is lower. This is generally as the angle of crash is less likely to be head on and speeds are lower.

323. The Waka Kotahi cycling guidance states that the injury crash rates for cyclists at roundabouts is higher than at other intersection types. It is also noted that the *"the safe system threshold impact speed for pedestrians, cyclists and motorcyclists is 30 km/h, which is easily exceeded at most roundabouts."*[9]

324. However, the Project is proposing to convert roundabouts within Lower Hutt central city to traffic signals, the opposite of the Waka Kotahi safe system approach for motorised vehicles. It is my view that in this environment the benefits to pedestrians and cycles from the signalled intersections more than offset any potential disbenefits from vehicular collisions. I base this on the lower speed environment within the urban area compared to the State Highway network operated by Waka Kotahi which is more generally higher speed roads and with a lower proportion of pedestrian and cyclists.

325. As previously shown in Table 1, the majority of pedestrian / cyclist crashes (excluding SH2) were recorded on High Street and Queens Drive. Therefore the conversion of roundabouts to signals on these roads is considered to likely reduce the crashes by providing a controlled crossing facility for pedestrians / cyclists.

6.8 Resilience

326. The current transport network has limited crossings of the Hutt River for Lower Hutt central city, each providing connections with SH2. These three bridges provide the crossing for pedestrians, cyclists, buses, freight and private vehicles. They are shown below in Figure 15.

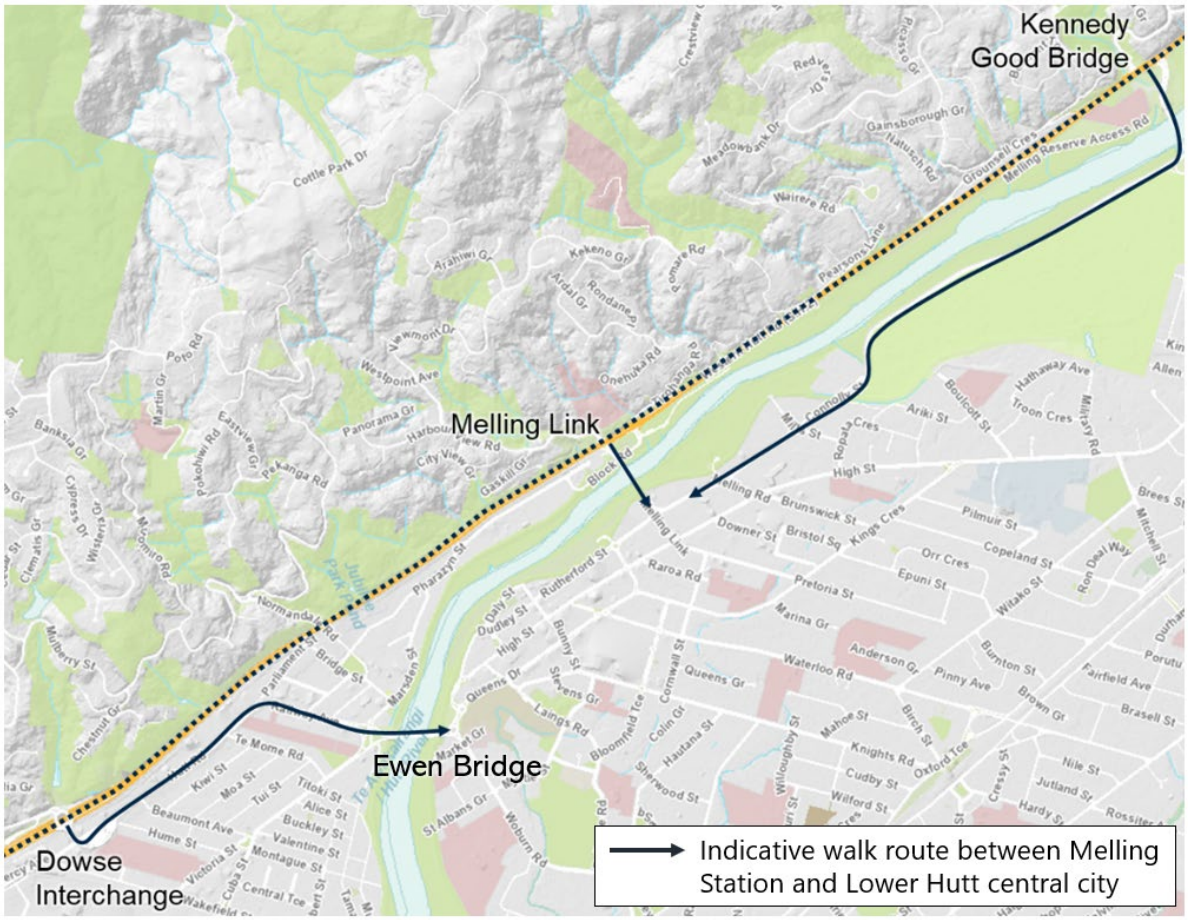


Figure 15 Network resilience plan

[9] Roundabouts | Waka Kotahi NZ Transport Agency (nzta.govt.nz) accessed 10/5/2021

327. The project will raise the height of the Melling Bridge and also provide increased flood protection to the surrounding area, including local transport connections and SH2.

328. Currently, if Melling Link becomes unavailable for crossing the Hutt River due to a natural hazard such as flooding or an earthquake, all transport movements would be required to be focussed on Ewen Bridge to the south, or Kennedy Good Bridge some 2.5km north.

329. Access to the Ewen Bridge connection would focus traffic through Lower Hutt central city which is already congested and this would impede public transport efficiency in particular, noting the number of services that use Ewen Bridge.

330. In a natural hazard event, the inability for pedestrians to use the existing Melling bridge would effectively lead to the removal of access for pedestrians between Melling Station and Lower Hutt central city due to the length of the detour required via Ewen Bridge. However I would anticipate that some of these pedestrians who have arrived by rail would use Western Hutt station. This would become a more logical location for boarding and alighting in this situation.

331. As detailed above, the safety assessment predicts a significant reduction in the frequency of serious or fatal crashes at the connection between SH2 and the link to Lower Hutt central city (Melling interchange). These crashes can often require temporary road closures to allow for treatment of those involved in the crash, recovery of vehicles and scene investigation. The reduction in the crash risk therefore reduces the frequency that Melling Link is available for access, therefore increasing the network resilience.

332. The additional connections to support walking and cycling, and the dedicated walking and cycling bridge which connects the rail station to Lower Hutt central city provides some additional degree of resilience through supporting alternate mode choices should there be some network disruption to a particular route or mode.

333. As such, it is my view that the increased resilience to natural events that I understand to be offered by the new Melling Bridge, is of significant benefit to the general access of Lower Hutt central city. In making this statement I rely on the information contained in the *Technical Assessment – Natural Hazards and Geotechnical.*

7 ASSESSMENT OF CONSTRUCTION TRANSPORT EFFECTS

7.1 Description of construction methodology

334. The construction methodology has been prepared as a staged approach to minimise the effects on the transport network. The rationale for each of the stages is outlined in the indicative construction methodology in Chapter 5 of the AEE (Volume 2 of the Application), and a summary of each stage is provided below.

i. Enabling works

ii. Stage 1: Pharazyn Street stopbank and realignment

iii. Stage 2: Daly Street stopbanks, Melling pedestrian bridge and Pharazyn Street realignment

iv. Stage 3: Melling Rail Station and Carpark

v. Stage 4: Melling Interchange commencement and Pharazyn Street stopbank completion

vi. Stage 5: Northbound Melling Interchange and bridge

vii. Stage 6: Melling Interchange on-ramp and State Highway 2 northbound

7.2 Site compound locations and access routes

335. The proposed site compound locations are shown below in Figure 16 and Figure 17 with the anticipated local access routes to these compounds also provided within the figures.

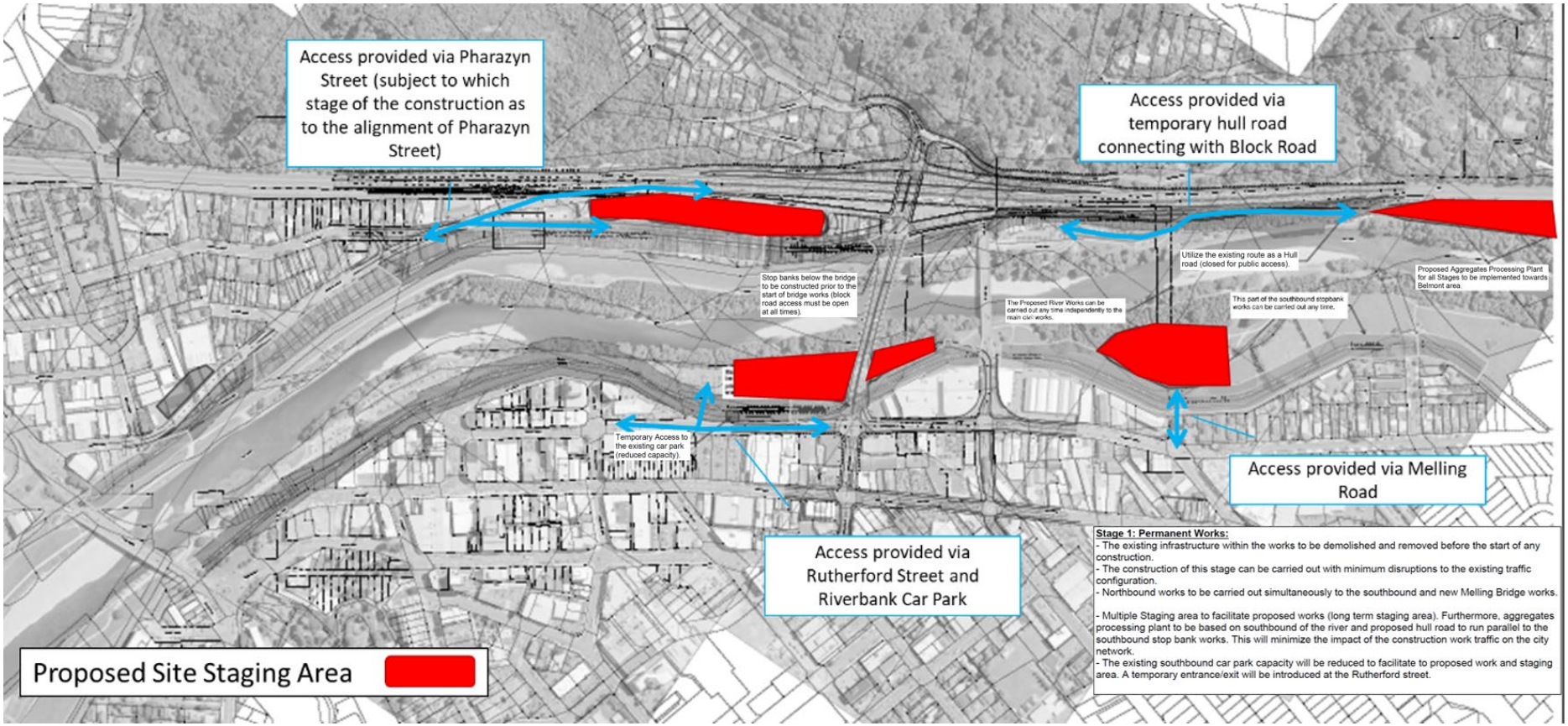


Figure 16 Construction site compounds and vehicular access

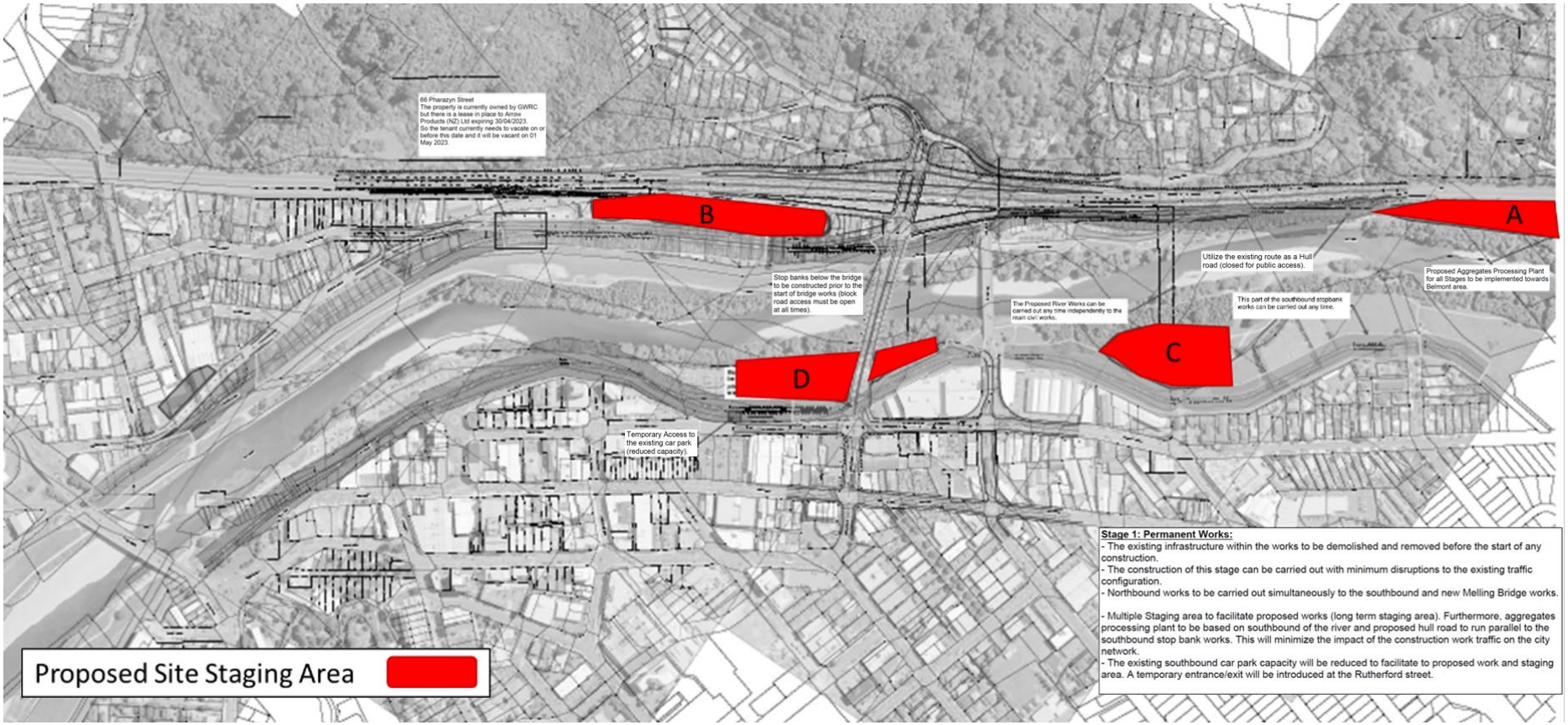


Figure 17 Construction site compounds

336. Table 6 below provides a summary as to when each of the site compounds are to be utilised for each of the stages. As shown in the table, as the stages progress the construction area moves into the areas previously utilised for the site compounds Site Compound D will be utilise for all stages of the project.

Table 6 Site Compound Utilisation Table

Stages	Compound A	Compound B	Compound C	Compound D
Stage 1	✓	✓	✓	✓
Stage 2	✓	✓	✓	✓
Stage 3	✓	✓	✓	✓
Stage 4	✓	-	✓	✓
Stage 5	✓	-	-	-
Stage 6	✓	-	-	-

337. The main site compound (Compound B above) is proposed to be located on the western side of the river just south of the existing Melling Train Station. Access will be facilitated via Pharazyn Street and a temporary haul road (from Pharazyn Street) and access from Kennedy Good Bridge and SH2 at the northern end of the site compound. A summary as to how each of the site compounds will be accessed is provided below:

    a. Site Compound A: Access will be provided via SH2 and Kennedy Good Bridge as well as a haul road to access any areas south of the compound.

    b. Site Compound B: Access will primarily be provided via Pharazyn Street

338. It is noted that outside the roads mentioned above, that generally construction traffic will utilise higher order roads in order to access the construction areas and site compounds. Where possible, construction traffic will avoid utilising local roads and therefore minimise the disruption to local traffic during the construction works.

7.3 Private access effects during construction

339. The proposed locations of the site compounds have been located to minimise the interaction with local residents, where possible, and to ensure the compounds are located conveniently with respect to the construction areas.

340. Residents living in close proximity to the construction areas (i.e. within Lower Hutt central city, Melling) are likely to experience an uplift in construction traffic within the general area, which may have an effect on vehicles waiting to enter or exit their property. However, this is not likely to cause significant delays to local residents during the construction process.

7.4 Temporary Market Location

341. With reference to the Urban and Landscape Design Framework, during construction there is potential to accommodate the existing market (typically located at the Riverbank car park) at one of the following locations:

    a. North Daly Street development site (temporary car park)

    b. Andrews Avenue and Dudley Street (on-street)

342. If the market was temporarily relocated to the North Daly Street site, the temporary car park of approximate 150 spaces would not be available for use during the market trading hours on Saturdays.

343. This reduction in parking supply is not considered to have a significant impact on the overall car parking supply for Lower Hutt central city. While there may be a higher parking demand within immediate proximity to the market (which will be impacted by the loss of use of the temporary car park), the parking supply in the broader Lower Hutt central city is much lower on Saturdays, and the current market operation is within the Riverbank car park. Therefore, I do not consider that the use of this site as a temporary market would create any specific transport related adverse effects for either market visitors, or other users of the Lower Hutt central City on market days.

344. If the market was temporarily relocated to Andrews Avenue and Dudley Street (on-street), this would require the closure of both streets during the trading hours (including set up and take down).

345. The implications associated with the closure of Andrews Avenue (between High Street and Dudley Street) and Dudley Street (between Andrews Avenue and Margaret Street) involve:

    a. The traffic diversion onto alternative routes, including High Street and Margaret Street.

    b. Vehicles will be restricted to access the North Daly Street site (temporary car park) via Margaret Street only.

346. As a result of the road closures during the market trading hours on Saturday, traffic will be diverted onto High Street and Margaret Street, as shown in Figure 18.

347. Due to the lower traffic demands on Saturdays (compared to Monday to Friday), the traffic diversion is not considered to have a significant impact on the operation of the road network.

348. The road closures are not considered to have a significant impact to surrounding parking since the North Daly Street site (temporary car park) will remain operational and accessible, for market visitors and Lower Hutt central city.

349. In regards to safe access to both sites, construction activities would not impede visitors accessing the markets safely by foot or cycle.

Figure 18 Traffic route diversion due to temporary market relocation

7.5 Estimated construction vehicle movements

350. Construction vehicle movements have been estimated for the following tasks, noting that movements with relation to structures works have not be included within this estimate.

a. Site Establishment

b. Traffic Management

c. Site Clearance

d. Earthworks

e. Road works

f. Landscaping

g. Services protection

h. Stopbank works

351. The estimated construction vehicle movements for each stage have been reported in the Construction methodology in Chapter 5 of the AEE, , and the relevant information with respect to daily traffic volumes is shown below.

Table 7 Summary of traffic volume information

Stage	Average one-way daily volume (vpd)	Peak one-way daily volume (vpd)
Stage 1	273	382
Stage 2	179	250
Stage 3	105	146
Stage 4	147	206

352. It is noted that the values shown above are one-way traffic movements and therefore the total volume would be double these numbers (ie delivery entering and exiting site, etc).

353. Stage 1 is anticipated to have the highest construction traffic, with an average of 546 daily movements and a peak of 764 daily movements expected during Stage 1. Generally, peak hour traffic (morning and afternoon) is accounted for approximately 10 percent of the total daily traffic movements.

354. Based on the above discussion, Stage 1 would be expected to have a total of 76 peak hour two-way movements during each of the peak periods. Assuming an average vehicle arrival during the peak hour period, this equates to one vehicle arriving to the site every 47 seconds. This level of construction traffic is expected to increase the total traffic utilising local roads during construction, however, is not expected to increase congestion and/ or delays within the area.

355. As Stage 1 has the highest volumes, it is expected that during the remaining stages that there would be a lower traffic volume during peak hour when compared with the analysis above.

356. It is expected that Stage 1 has the highest traffic volume due to the amount of works being undertaken within the stage when compared with other stages. Within Stage 1, all the site clearance works are required to be undertaken as well as the initial works for both stopbanks. Majority of the vehicle traffic will be travelling to/ from Site Compound B during Stage 1 and therefore majority of the traffic during this stage will be utilising SH2 and Pharazyn Street for site access.

357. Stage 2 is expected to have vehicle movements to all the site compounds, with majority of the traffic utilising Compounds C and D for the works within this stage.

358. Stage 3 is expected to have majority of movements to and from Site Compound B for works to Melling Station and Pharazyn Street and a small number of movements utilising Site Compounds C and D for the Rutherford intersection works.

359. Stage 4 is expected to heavily utilise Compound A and Compound D during this stage of the works. Compound A will provide access to/from the works at the Melling interchange and Compound D will provide access to/ from the works on the right stopbank and intersections works on Queens Drive.

360. Stages 5 and 6 will be solely provided vehicular access via Site Compound A, as all other compound areas are within areas of completed construction. Access to/from Compound A will be provided via SH2 and Kennedy Good Bridge.

7.5.1 Construction parking impacts

361. I have provided a summary of the impacts on parking throughout the project within Appendix K. The changes to parking vary through the project stages as specific activities occur.

362. It should be noted that throughout the construction period the maximum reduction of parking spaces does not exceed the end state loss of parking as assessed above. The construction period parking is expected to include the temporary use of some 150 parking spaces on Daly Street following the demolition of buildings. As such this can provide a transitional parking supply until the full benefits of the multimodal accessibility improvements are delivered. Further sites may be identified as the project design progresses and further detail in relation to construction sequencing and the contractor needs in relation to compounds.

7.6 Stage One

7.6.1 Construction access safety effects

363. The main site compound (Compound B) is located on the western side of the river, just south of the existing Melling Train Station, and is proposed to be accessed via Pharazyn Street, SH2 and Kennedy Good Bridge. Access to the site compound from the north will be provided adjacent to the Belmont School. Temporary pedestrian and cyclist access will be facilitated along the western side of Hutt River, however vehicular access along Block Road will be restricted to only construction vehicles. It is noted that pedestrian and cyclist access to Belmont School will continue to be provided via the underpass under SH2, as one of the primary access routes to/ from the school.

364. It is noted that Block Road will be blocked in the permanent solution and not just closed during the construction phase and therefore hasn't been considered as a construction effect.

365. There is expected to be an increase in heavy vehicle movements travelling to/ from Site Compound B. The increase in heavy vehicle movement activity within close proximity to a school does increase the likelihood of an incident between a heavy vehicle and a vulnerable road user (student). Measures that could be introduced to reduce the interaction between the pedestrians and cyclists accessing the school and the heavy vehicle movements could be additional barriers to ensure separation between pedestrians and the heavy vehicles and potentially restricting heavy vehicle access during peak school times. A reduction in speed limit along the haul road would also reduce the likelihood of an incidents between heavy vehicles and pedestrians.

366. Site Compound C is likely to be utilised for the works relating to the eastern stopbank. Vehicular access to this compound is expected via SH2 and Melling Bridge and therefore expected to increase the volumes travelling towards Lower Hutt central city on Melling Bridge and increasing congestion and delays on Melling Bridge.

367. Figure 19 below demonstrates the anticipated construction vehicle route for access during Stage 1, it has been assumed that all vehicles will be utilising Pharazyn Street for access. Beyond Pharazyn Street, construction vehicles are expected to utilise Bridge Street, Railway Avenue and Hutt Road in order to access SH2.

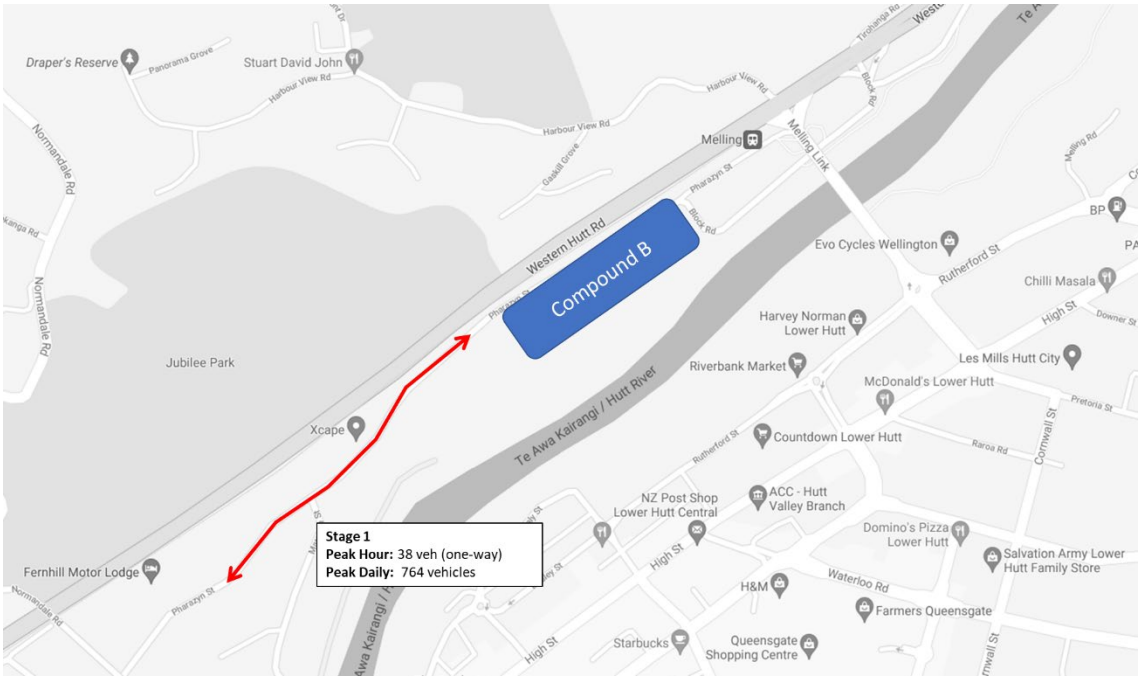


Figure 19 Stage 1 Construction Route

368. The level of traffic during the peak hour shown above is expected to have a minor effect for drivers utilising Pharazyn Street.

7.6.2 Public road access effects

369. The Stage 1 works are generally confined to the western bank of the river and the closure of Marsden Street is expected to affect vehicles accessing the Melling Train Station, with a diversion in place to utilise Pharazyn Street as a detour route. This is expected to have a negligible increase in the time travelled by persons accessing Melling Train Station.

370. Pharazyn Street is expected to cater for an increased number of vehicle movements with the detoured vehicles previously utilising Marsden Street, as well as the secondary construction access route to Site Compound B will be provided via Pharazyn Street. It is expected that there will be a slight increase to delays experienced by drivers on Pharazyn Street, however this is not expected to deter vehicles from using Pharazyn Street. There is a height-restricted bridge at the southern end of Pharazyn Street. However, this is a secondary route and it is considered unlikely it would be used by high vehicles. .

371. As outlined in para 363 above, there is expected to be an increase in traffic on both State Highway 2 and Kennedy Good Bridge with vehicles utilising these roads to access Site Compound B, however this is unlikely to deter drivers from utilising these roads during the construction stage as delays will be minimal.

372. Traffic modelling undertaken to assess the effects of the speed reductions through the project site on SH2 suggest that the effect would be relatively minimal. This is included as Appendix A. There is a minor reduction in traffic on state highway predicted as a result of the increased travel time, although as the speed during the peak periods is constrained by congestion, the effects could be greater outside of the peak periods. This negligible effect on the State Highway is retained through all subsequent stages of work.

373. The traffic modelling detailed that approximately 2,000 daily vehicle trips would be re-routed due to the speed reduction on SH2, with these vehicles re-routing to utilise other north-south roads such as Railway Avenue and Connolly Street.

374. Predicted changes in travel time between SH2 and Rutherford Street has been investigated within the traffic modelling. During Stage 1, the travel times effected due to the construction work is for vehicles travelling north-south on SH2 (due to the speed reduction in place).

375. The upgrade works to the intersection of Railway Avenue/ Marsden Street/ Ewen Bridge is expected to increase congestion within the local area, with traffic management lowering speeds through the intersection to continue to facilitate access to Ewen Bridge. This is not expected to deter drivers from travelling through this intersection, as Ewen Bridge is a key access to Lower Hutt central city and therefore drivers would still utilise this route even with some delays experienced travelling through the intersection.

7.6.3 Public transport effects

376. As outlined in paragraph 375, works to the Railway Avenue/ Marsden Street intersection is likely to affect the bus services that utilise the intersection in order to access Lower Hutt central city. It is not expected that any detours will be required for the public transport network, however the travel time through these areas are expected to increase. This is unlikely to deter patrons from utilising public transport as their form of transport, but it would be expected that there is a slight increase in overall travel time.

7.6.4 Temporary active travel effects

377. Access to the western bank of the river is expected to be affected during Stage 1 works and therefore access to the western bank shared path for cyclists and pedestrians. It is expected that pedestrians and cyclists would either swap to the other bank of the river (via Ewen Bridge or Melling Bridge). It is anticipated that the effect on cyclists and pedestrians would be an increased travel time for their trip but with proper warning signage, it is unlikely to deter cyclists and/ or pedestrians from utilising this form of transport.

378. It is expected that access to Melling Train Station will be affected for pedestrians wanting to access the station from the south-west (ie via Marsden Street), as the closure of Marsden Street will force pedestrians to utilise Pharazyn Street as a detour option to access the station. While the overall travel time for pedestrians accessing Melling Station is expected to increase during this stage, it is not expected to deter persons from utilising the train.

7.6.5 Parking effects during construction

379. The effect on available car parking during Stage 1 is anticipated to be minimal, with only spaces along Marsden Street becoming unavailable at this stage. During this stage, a temporary car parking area will be constructed on some of the undeveloped land on the eastern side of the river, which will provide offset to some of the car parking that is lost in later stages. Therefore, it is expected that there will be little to no modal shift during this stage with people still driving to Lower Hutt central city and parking in the new car parking opportunity.

380. When compared with the existing environment, during Stage 1 there will be 62 additional parking spaces available as outlined within Appendix K.

7.7 Stage Two

7.7.1 Construction access safety effects

381. It is proposed that majority of construction traffic during this stage will be accessing Site Compounds C & D via SH2 and the existing Melling Bridge. With this increase in traffic utilising SH2 and Melling Bridge it is expected that SH2 will be able to accommodate the additional traffic with negligible effect, but it is expected that congestion and delays on Melling Bridge will increase with the presence of additional construction vehicles.

382. Site Compound B will still be utilised for works relating to the changes at Pharazyn Street and western stopbank works, with access provided via Pharazyn Street and the haul road to Site Compound A. There is expected to be a negligible effect on the congestion and delays experienced due to the construction traffic accessing Site Compound B during Stage 2.

383. Figure 20 below demonstrates the anticipated construction vehicle route for access during Stage 2, it has been assumed that all vehicles will be utilising Melling Link for access to Compounds C and D.

Figure 20 Stage 2 Construction Route

384. The level of traffic during the peak hour shown above is expected to have a minor effect for drivers utilising Melling Link. While the peak hour volume of 25 vehicles (each direction) is low when compared with the total number of vehicles utilising Melling Link, the construction vehicles are expected to increase travel time in the area.

7.7.2 Public road access effects

385. As outlined in paragraphs 369 and 370, Pharazyn Street will be utilised for vehicle access along the western side of the river. During Stage 2, the access to Pharazyn Street will transition to be via a temporary road while upgrades are made to the intersection between Pharazyn Street and Marsden Street. The access to Melling Train Station will still be facilitated during this stage, however some minor delays are expected due to the temporary nature of the access route.

386. The proposed upgrades to intersections along High Street will create a detour for vehicles previously using High Street, to have to use Queens Drive for north-south access through Lower Hutt central city. This is expected to increase the volumes along Queens Drive but is not expected to have a material effect on the congestion and delays experienced along Queens Drive.

7.7.3 Public transport effects

387. During Stage 2, the Riverbank Car Park is to be partially closed to public access and this is expected to increase the patronage of the bus network and train network, with persons adjusting their mode of transport to access the central city. This increase in patronage is likely to have a negligible effect on the delays experienced on the public transport network.

388. Intersection upgrades along Queens Drive are expected to increase the travel time experienced by buses accessing Lower Hutt central city, however this is not expected to deter persons from utilising public transport to access the central city.

7.7.4 Temporary active travel effects

389. Access to the eastern and western bank of the river is expected to be affected during Stage 2 works and therefore access to these banks shared path for cyclists and pedestrians. It is expected that pedestrians and cyclists would either swap to the other bank of the river (via Ewen Bridge or Melling Bridge) or utilise the local roads within Lower Hutt central city for north-south access. It is anticipated that the effect on cyclists and pedestrians would be an increased travel time for their trip but with proper warning signage, it is unlikely to deter cyclists and/ or pedestrians from utilising this form of transport.

390. While the intersections on High Street and Queens Drive are being upgraded, it is expected that pedestrian and cyclist access would be affected in these localised areas. Pedestrians and/ or cyclists if they continue to utilise the intersections for access would experience some delays when travelling past the work zones. Alternatively, pedestrians and cyclists could utilise other roads within Lower Hutt central city for access to travel clear of the work zones. This alternative would slightly increase the travel time but is not expected to create a significant delay for pedestrians or cyclists.

7.7.5 Parking effects during construction

391. Stage 2 proposes to close public access to the Riverbank Car Parking area. It is noted that the temporary car parking area built within Stage 1 is expected to offset the loss of car parking spaces experienced due to the closure of the Riverbank Car Park. However, this removal of the Riverbank Car Park is expected to have a significant effect on the availability of parking within the Lower Hutt central city area.

392. It is anticipated that there will be a temporary removal of on-street parking spaces during the upgrade works to the High Street and Queens Drive intersections, which are expected to create a small reduction in available spaces within the Lower Hutt central city area.

393. When compared with the existing environment, during Stage 2 there will be 418 less parking spaces available as outlined within Appendix K.

7.8 Stage Three

7.8.1 Construction access safety effects

394. Similar to Stage 1, Stage 3 is expected to have majority of the construction traffic accessing Site Compound B and a portion of the movements to Site Compounds C and D to account for the upgrade works to Rutherford Street. The potential effects on the vehicle movements associate with Site Compound B are outlined in 363 above.

395. Figure 21 below demonstrates the anticipated construction vehicle route for access during Stage 3, it has been assumed that all vehicles will be utilising Pharazyn Street for access to Compound B. Beyond Pharazyn Street, construction vehicles are expected to utilise Bridge Street, Railway Avenue and Hutt Road in order to access SH2.

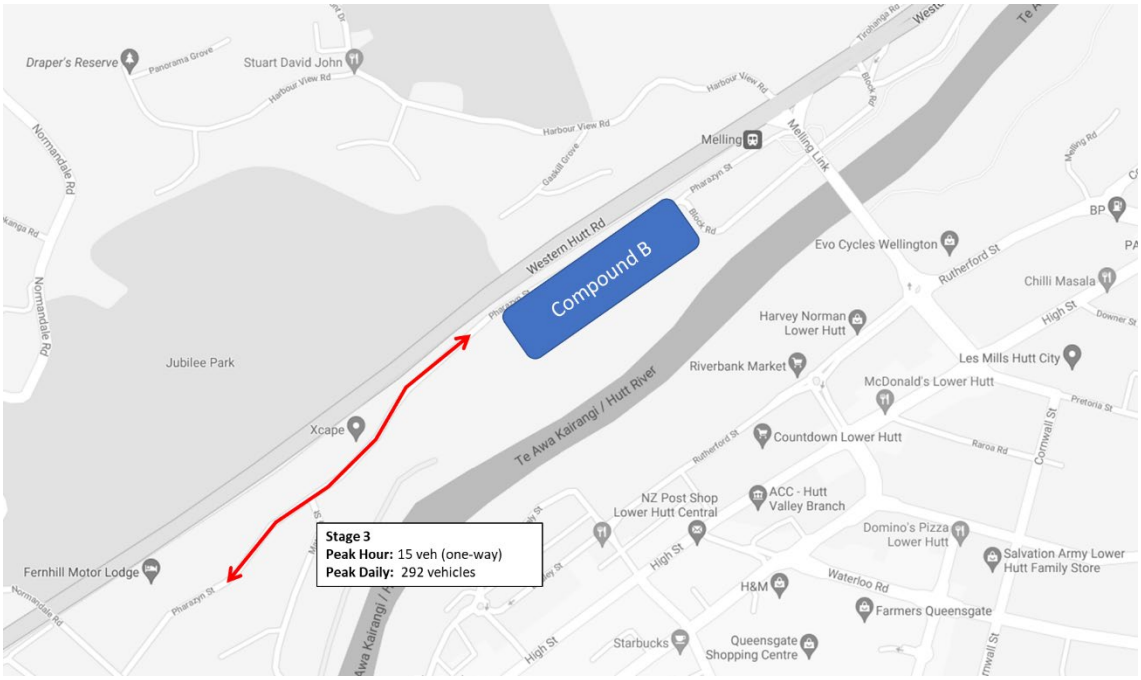


Figure 21 Stage 3 Construction Route

396. The level of traffic during the peak hour shown above is expected to have a negligible effect for drivers utilising Pharazyn Street.

7.8.2 Public road access effects

397. The closure of Rutherford Street and the short section of Queens Drive is expected to have a significant adverse effect on vehicular access through Lower Hutt central city, with diversions in place via High Street. This is shown in the Transport Modelling report included as Appendix A. It is anticipated that congestion and delays on High Street are to increase due to these diversions, and as a result traffic diverts over a wide area, including Kings Crescent, and Pharazyn Street.

398. The traffic demands experienced on High Street is expected to reduce, with increased delays anticipated at the Melling Link/ High Street intersection.

399. Predicted changes in travel time between SH2 and Rutherford Street has been investigated within the traffic modelling. During Stage 3, the travel time for vehicles accessing Lower Hutt (Rutherford Street) is expected to increase during both peak periods.

400. During this phase of construction I anticipate that there would be a moderate adverse effect on traffic flows through the central city. Where possible, some people may choose to travel earlier or later to avoid peak periods. I also consider that there may be some people who

chose not to travel to the central city at all, and chose alternate locations if their trip does not need to be to Lower Hutt specifically.

401. As outlined in 369 and 370, Pharazyn Street will be utilised for vehicle access along the western side of the river. During Stage 3, the access to Pharazyn Street will remain via a temporary road while upgrades are made to the intersection between Pharazyn Street and Marsden Street.

7.8.3 Public transport effects

402. There is expected to be no effect on the bus network within the local area due to the construction works associated with Stage 3.

403. During the construction of the new Melling Train Station, there is potential for the train services to be closed if critical works are required to be undertaken and cannot be done outside of the train timetable. This closure would likely increase the number of persons driving within the local area as the train service would be unavailable.

7.8.4 Temporary active travel effects

404. In close proximity to the new pedestrian bridge and Melling Link bridge there is expected to be minor detours in place. This will affect the access of pedestrians and cyclist at these locations with a small detour required around the construction area. This effect is unlikely to deter pedestrians and cyclists from utilising the area.

405. The construction activity associated with the new Melling Station and adjacent cycleway is anticipated to affect the cyclist utilising SH2 for north-south access. It is expected that traffic management would be in place if SH2 is affected by the works and therefore the effect on cyclists in this location is expected to be minimal.

7.8.5 Parking effects during construction

406. As outlined within 391 above, the Riverbank car park is closed to public access and the nearby temporary car parking area will offset the loss of spaces due to the closure. The effect on parking opportunities is anticipated to be negligible during this stage.

407. It is anticipated that there will be a temporary removal of on-street parking spaces during the upgrade works to the Rutherford Street and Queens Drive intersection, which are expected to create a small reduction in available spaces within the Lower Hutt central city area.

408. When compared with the existing environment, during Stage 3 there will be 354 less parking spaces available as outlined within Appendix K.

7.9 Stage Four

7.9.1 Construction access safety effects

409. Stage 4 is expected to heavily utilise Compound A and Compound D during this stage of the works. Compound A will provide access to/from the works at the Melling Interchange and Compound D will provide access to/ from the works on the right stopbank and intersections works on Queens Drive. As discussed previously in 363 above, construction traffic will primarily access Site Compound A via SH2 and Kennedy Good Bridge.

410. Compound D will be accessed via SH2 and Melling Bridge with a minor increase to congestion and delays experienced on Melling Bridge due to the addition of construction vehicles.

411. Figure 22 below demonstrates the anticipated construction vehicle route for access during Stage 4, it has been assumed that there is an even split between the two site compounds (A and D) utilised during this stage. With access to Compound A being facilitated by Kennedy Good Bridge and access to Compound D via Melling Link.

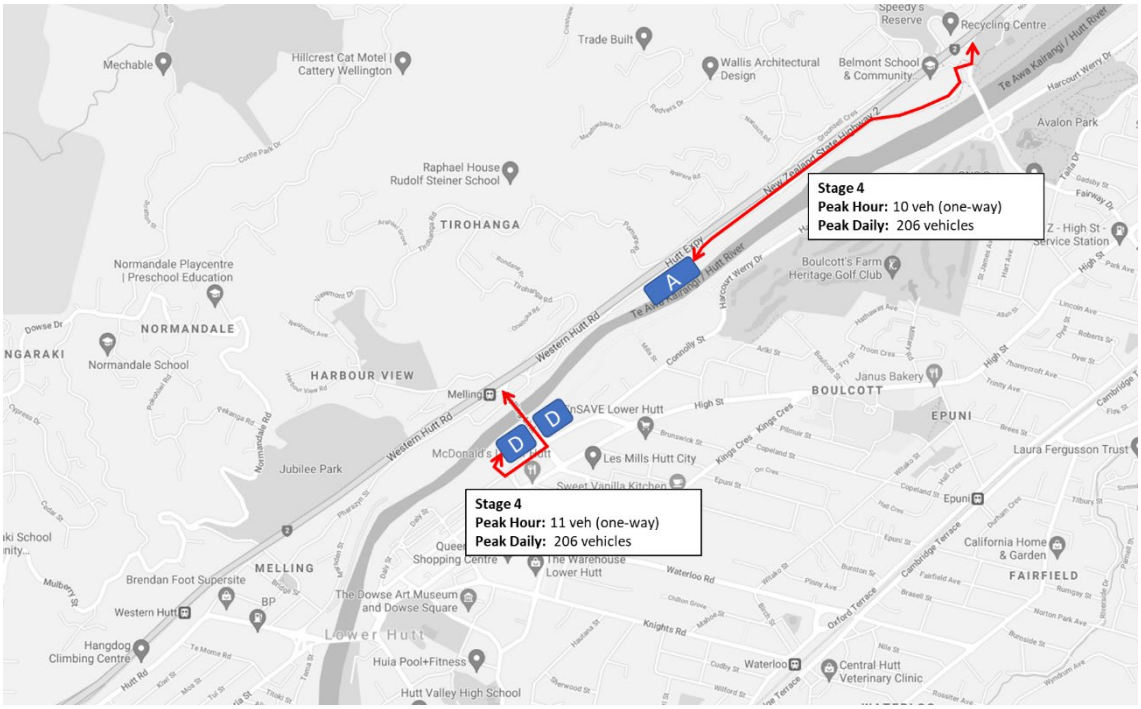


Figure 22 Stage 4 Construction Route

412. The level of traffic during the peak hour shown above is expected to have a negligible effect on vehicles utilising Melling Link and Kennedy Good Bridge.

7.9.2 Public road access effects

413. The roadworks along SH2 is expected to increase congestion and delays for drivers passing the construction area. The effect of this increase in congestion may encourage drivers to utilise Melling Bridge and Ewen Bridge in order to avoid the delays anticipated by the roadworks on SH2. This in turn will increase the congestion and delays on Queens Drive and High Street within Lower Hutt central city as drivers divert away from SH2.

414. The upgrades to remaining Lower Hutt central city intersections (Dudley/ Laings, etc) is expected to create a localised diversion onto High Street as vehicles are unable to travel on the abovementioned roads. While this is likely to delay vehicles utilising High Street, it is unlikely that this would deter vehicles from utilising High Street or Queens Drive for their route through Lower Hutt central city.

415. Traffic modelling, as shown in Appendix A, to determine the effect on travel time to Lower Hutt has been prepared for during Stage 4 of construction. With significant roadworks during undertaken within Lower Hutt, the travel times for vehicles accessing Lower Hutt from SH2 is anticipated to increase during this phase. The increased travel time is expected to occur during both peak periods.

416. It is noted that as the intersections within Lower Hutt are to be signalised, rather than priority controlled intersections (as current conditions), the traffic modelling suggests that by signalising the intersection in close proximity to Melling Link, this will further increase the journey time experienced for vehicles accessing Lower Hutt, until the completion of the new Melling Bridge. This adverse effect on the travel times is retained through all subsequent stages of work.

7.9.3 Public transport effects

417. With the completion of the pedestrian bridge connecting Lower Hutt central city and the new Station, it is expected that more patronages will consider utilising the train as their mode of choice to/ from the central city. This is likely to have a negligible effect on the operation of train services from the train station.

7.9.4 Temporary active travel effects

418. In close proximity to the stopbank construction areas and the Melling Link bridge there are expected to be minor detours in place. This will affect the access of pedestrians and cyclists at these locations with a small detour required around the construction area. This effect is unlikely to deter pedestrians and cyclists from utilising the area.

419. While Dudley Street, Margaret Street and Andrews Avenue being upgraded, it is expected that pedestrian and cyclist access would be affected in these localised areas. Pedestrians and/ or cyclists if they continue to utilise the intersections for access would experience some delays when travelling past the work zones. Alternatively, pedestrians and cyclists could utilise other roads within Lower Hutt central city for access to travel clear of the work zones. This alternative would slightly increase the travel time but is not expected to create a significant delay for pedestrians or cyclists.

420. The roadworks on SH2 are likely to affect the cyclists utilising SH2 as their primary route. There is expected to be alternative options available for cyclists, such as the stopbank shared paths, and therefore it is anticipated that there will only be a small increase in travel time for cyclists when travelling through this area.

7.9.5 Parking effects during construction

421. As outlined within 391 above, the Riverbank car park is closed to public access and the nearby temporary car parking area will offset the loss of spaces due to the closure. The effect on parking opportunities is anticipated to be negligible during this stage.

422. It is anticipated that there will be a temporary removal of on-street parking spaces during the upgrade works to the Dudley Street, Margaret Street, Andrews Avenue, etc which are expected to create a small reduction in available spaces within the Lower Hutt central city area.

423. When compared with the existing environment, during Stage 4 there will be 531 less parking spaces available as outlined within Appendix K.

7.10 Stage Five

7.10.1 Construction access safety effects

424. All construction vehicle access is proposed to occur via Site Compound A, the access safety effects have been discussed in 363 above.

7.10.2 Public road access effects

425. During the works to upgrade the Melling Interchange, it is expected that local access to Harbour View Road and Tirohanga Road will be restricted. An increase in delays is expected for drivers wanting to access these roads however will traffic management in place, it is expected that the delay will not deter drivers from utilising these roads for access.

426. The roadworks along SH2 is expected to increase congestion and delays for drivers passing the construction area. The effect of this increase in congestion may encourage drivers to utilise Melling Bridge and Ewen Bridge in order to avoid the delays anticipated by the roadworks on SH2. This in turn will increase the congestion and delays on Queens Drive and High Street within Lower Hutt central city as drivers divert away from SH2.

7.10.3 Public transport effects

427. There is expected to be no effect on the public transport network within the local area due to the construction works associated with Stage 5.

7.10.4 Temporary active travel effects

428. The roadworks on SH2 are likely to affect the cyclists utilising SH2 as their primary route. There is expected to be alternative options available for cyclists, such as the stopbank shared paths, and therefore it is anticipated that there will only be a small increase in travel time for cyclists when travelling through this area.

429. Access to the western bank of the river is expected to be affected during Stage 6 works and therefore access to the western bank shared path for cyclists and pedestrians. It is expected that pedestrians and cyclists would either swap to the other bank of the river (via Ewen Bridge or Melling Bridge or new pedestrian bridge). It is anticipated that the effect on cyclists and pedestrians would be an increased travel time for their trip but with proper warning signage, it is unlikely to deter cyclists and/ or pedestrians from utilising this form of transport.

7.10.5 Parking effects during construction

430. During this stage of the project, the temporary car parking area (150 spaces) is proposed to be removed and therefore further reduce the car parking availability within the study area. When compared with the existing environment, during Stage 5 there will be 711 less parking spaces available as outlined within Appendix K.

7.11 Stage Six

7.11.1 Construction access safety effects

431. All construction vehicle access is proposed to occur via Site Compound A, the access safety effects have been discussed in 363 above.

7.11.2 Public road access effects

432. The roadworks along SH2 is expected to increase congestion and delays for drivers passing the construction area. The effect of this increase in congestion may encourage drivers to utilise Melling Bridge and Ewen Bridge in order to avoid the delays anticipated by the roadworks on SH2. This in turn will increase the congestion and delays on Queens Drive and High Street within Lower Hutt central city as drivers divert away from SH2.

433. The works associated with decommissioning the existing Melling Bridge & associated intersection works is anticipated to have a minor effect on vehicle access travelling along Rutherford Street. This potential increase in delays due to the nearby construction works is expected to be mitigated by the presence of traffic management to guide vehicle either around the work zone or to an appropriate detour route. This measure is likely to reduce the delays experienced by drivers travelling past the work zone.

7.11.3 Public transport effects

434. There is expected to be no effect on the public transport network within the local area due to the construction works associated with Stage 6.

7.11.4 Temporary active travel effects

435. In close proximity to the area dedicated to the decommissioning of the Melling Bridge there is expected to be minor detours in place. This will affect the access of pedestrians and cyclist at these locations with a small detour required around the construction area. This effect is unlikely to deter pedestrians and cyclists from utilising the area.

7.11.5 Parking effects during construction

436. No further effects on parking availability during Stage 6 of the project.

8 MEASURES TO AVOID, REMEDY OR MITIGATE ACTUAL OR POTENTIAL ADVERSE TRANSPORT AND TRAFFIC EFFECTS

437. The proposed scheme will deliver significant benefits to the transport environment in the Project area. The removal of the at grade intersection at Melling will produce safety and efficiency benefits for state highway traffic. The extensive network of walking and cycling paths and crossing facilities promotes accessibility and safety for active mobility users. And the reduced journey time on state highway will reduce the desirability to use the local Hutt roads for through trips, delivering safety and efficiency benefits for local movements of all modes.

438. However, as described in previous chapters, there are some effects, mainly related to parking, or localised access changes for which mitigations are recommended. This chapter provides details of the potential for mitigations and the nature of those mitigations.

8.1 Parking

439. The Project delivers accessibility benefits for walking, cycling and public transport, delivering safer, more reliable and more convenient journeys by these modes. In the case of the public transport, the reduction in through traffic on the local Lower Hutt roads improves reliability for buses, and the relocated rail station with direct footbridge into Lower Hutt central city supports mode shift to decrease the proportion of trips made using private motor vehicles, especially for commute trips. As such, the Project itself forms part of the mitigation for the loss of parking, through the provision of alternate means for access.

440. These alternate modes can also be viable and attractive for some non-commute trips, but it is recognised that for some trips and some visitors using a car will remain a preferred mode to access Lower Hutt, and as such there will be a need for parking to serve this continuing demand.

441. In order to mitigate the parking spaces that are required to be removed (detailed in earlier sections of this assessment) to enable the Project, I recommend Hutt City Council should undertake a review of the overall parking stock in Lower Hutt central city, including the public car parks not directly affected by the Project and wider on street parking, to provide an appropriate mix of short, long term parking, loading bays and accessible parking spaces.

442. Whilst the review should take a wide view of the options, I recommend that the following specific elements are considered, and where feasible and deemed beneficial implemented:-

- Parking time (duration) limits
- Parking pricing strategy
- Park & Ride (bus based)
- Signage for parking areas; and
- Enforcement strategies for Lower Hutt central city area.

443. The review should consider the appropriateness of the pricing structure and any time limits on all council controlled parking in Lower Hutt central city. This will allow an appropriate spatial distribution of parking opportunity to be provided to support the various commercial and retail businesses in Lower Hutt central city.

444. I recommend that the parking review seeks to focus the reduction in the parking numbers on the long term commuter spaces, through a combination of limiting the number of long term spaces, and from increased costs for all day parking.

445. As part of the review, consideration should be given to the need to enhance the enforcement regime in central Lower Hutt during and following construction to mitigate the risks of parking occurring in locations outside of car-parks or marked on street bays which could lead to adverse safety effects, blocking of access to properties or impede the efficient flow of traffic on roads and through intersections.

446. Subject to the review, it may be necessary to include a transitional parking plan to phase the reductions to allow for the impact to be graduated which will reduce the scale of any adverse effects. I also recommend that alternate parking locations are provided during construction to mitigate the loss of parking prior to the delivery of the full multi-modal benefits of the Project. Whilst approximately 150 spaces have been indicatively identified to be provided adjacent to Daly Street, alternate or additional capacity should be considered during the detailed design phases of the project and prior to construction.

447. The transitional plan should also consider the potential for temporary park and ride sites, enhanced public transport (bus and rail) services and active promotion of non car-based access modes through a travel behaviour change programme,

448. I consider that these mitigations will reduce the risks associated with the reduction of parking in Lower Hutt central city during construction and following the completion of the Project.

8.2 Public transport

449. As highlighted, one of the Project benefits identified is improved reliability of the public transport system. When accompanied with the improvements to the environment for the walk to and from the bus stop and rail station for the majority of locations, this in itself mitigates some of the adverse effects from the Project.

450. I recommend that GW, through Metlink, monitor the patronage on bus services, and should capacity be reached as a result of mode-change associated with the project, additional services be added to prevent overcrowding.

8.3 Construction

451. The assessment of construction effects has shown that the biggest adverse effects occur during stage 3 with the closure of Rutherford Street to through traffic.

452. We consider the following measures are required to avoid potential adverse effects which include:

i. Restrictions on the lanes / speed required to be retained on SH2 throughout

ii. Some restrictions (but retain contractor flexibility) on concurrent activity in Lower Hutt central city

iii. Monitoring of delays on key routes (to be defined in CTMP)

iv. Retaining Melling line rail operational throughout construction with parking

v. Safe access to be retained for walking and cycling

vi. Provision of protective barriers between Belmont School and the Block Road haul route

vii. Limiting the duration of the closure of Rutherford Street and preventing other works that may reduce capacity on parallel routes during stage 3 of the RiverLink construction

viii. Implementing a temporary lane configuration and signal phasing at Melling Link / Rutherford Street during construction

ix. Provision of transitional / temporary public parking within Lower Hutt central city; and

x. A Construction Traffic Management Plan to be prepared to include all above matters and be submitted to the Project Partners in advance of construction commencing.

9 ALIGNMENT WITH POLICIES, STRATEGIES AND OBJECTIVES

9.1 National policy

9.1.1 National Policy Statement on Urban Development (NPS-UD) 2020

453. The NPS-UD came into force in August 2020. It seeks to enable greater supply and be more responsive to changes in demand for urban development. The NPS-UD also seeks to support the diverse needs of communities and create well-functioning, liveable urban environments.

454. Within the NPS Hutt City is defined as part of the 'Tier 1 urban environments. The most directly relevant element of the act is the requirement for Hutt City to remove minimum parking requirements from the City Plan. This is directly relevant to the proposals for the development areas which are enabled by RiverLink.

455. Of the outcomes sought by the NPS, the intent is that *"more people will live in areas with good public and active transport links, meaning that they are not reliant on cars for transport".* I consider that the range of active and public transport proposals included in RiverLink support the future planned intensification of the central city, and so is in good alignment.

9.1.2 Wellington Regional Mode Shift Plan 2020

456. The Regional Mode Shift Plan is one of a series of six regional plans for the high growth urban areas across New Zealand. The Wellington Regional Mode Shift Plan, which encompasses Lower Hutt within the plan, defines the focus areas against three levers defined by the overarching Waka Kotahi strategy for mode shift. These are:

i. Shaping Urban Form

ii. Making shared and active modes more attractive

iii. Influencing travel demand

457. The project will support the delivery of intensification of the central city associated with the development areas. Combined with the updated transport requirements of the NPS-UD, these will support the intent of the Mode Shift Plan. The provision of the network of active mode facilities within the project and connections to external active mode routes support making shared and active modes more attractive to users for a range of journey purposes. As such UI consider the project is well aligned with the Wellington Regional Mode Shift Plan.

9.1.3 Government Policy Statement 2018

458. The Government Policy Statement on land transport (GPS) outlines the government's strategy for investment in land transport over the next 10 years, which is implemented by Waka Kotahi via the National Land Transport Programme. GPS 2018 commits to safety, mode neutrality, liveable cities, regional economic development, protecting the environment, and delivering the best possible value for money. The four strategic priorities are a land transport system that:

i. **Safety** – is a safe system, free of death and serious injury

ii. **Access** –

a. provides increased access to economic and social opportunities

b. enables transport choice and access, and

c. is resilient

iii. **Environment** - reduces greenhouse gas emissions as well as adverse effects on the local environment and public health, and

iv. **Value for money** – delivers the right infrastructure and services to the right level at the best cost.

459. I consider that the proposals for the grade separation of SH2 Melling Link, the proposed measures to provide off-road cycling routes, and enhanced on-road routes and signalisation of intersections within Lower Hutt, providing pedestrian facilities all are in alignment with supporting a safe system approach to meeting the safety priority.

460. The relocated rail station, direct pedestrian and cycle bridge to Lower Hutt central city and wider walking and cycling networks provide greater choices for travel to and from the Lower Hutt central area. I understand from Mr Pennington, who undertook the River Hydraulics Technical Assessment (Technical Assessment #1 – Volume 4 of the Application), that the increase in the height of the new Melling Link compared to the current will reduce the risk of the bridge being closed during or following a heavy rainfall event, and this maintains a key access route between SH2 and Lower Hutt central city.

461. As such I consider that the Project is well aligned with the relevant GPS at the time of design and this assessment.

462. I note that an updated version of the GPS has been published which comes into effect on 1 July 2021, after the preparation of this assessment, and following the design and assessment of the Project. The GPS 2021 priorities are amended to be:

i. Safety

ii. Better travel options

iii. Improving freight connections, and

iv. Climate change.

463. I consider that my assessment of the Project above would equally apply to the Safety and Better Travel Options priorities in the GPS (2021). Additionally, the removal of the signalled intersection on SH2 is of particular benefit to freight vehicles where the deceleration and acceleration at the stopline creates a more significant impact on efficiency.

9.1.4 Climate Change Response Act 2002

464. The Climate Change Response Act 2002, as amended by the Climate Change Response (Zero Carbon) Amendment Act 2019, provides a framework for New Zealand to develop and implement clear and stable climate change policies that:

i. Contribute to the global effort under the Paris Agreement to limit the global average temperature increase to 1.5° Celsius above pre-industrial levels, and

ii. Allow New Zealand to prepare for, and adapt to, the effects of climate change.

465. The Act requires the Government to develop and implement policies for climate change adaptation and mitigation.

466. A full assessment of the sustainability of the Project is outside of my scope, however I note that the Project provides options for alternate travel to the private car and also removes the need for vehicles to stop on SH2 which requires deceleration and subsequent acceleration that produce additional emissions from internal combustion powered vehicles.

9.1.5 Vision Zero – Road to Zero (2019)

467. Vision Zero was introduced by the Government in December 2019 and places human wellbeing at the heart of road transport planning. It outlines a road safety system which supports and expects road users to make good choices but acknowledges that we all make mistakes. Road safety system design influences road user behaviour and enhances driving culture, which ultimately improves road safety.

468. There are seven guiding principles in Vision Zero which will be achieved through action in the following five key focus areas:

    i. Infrastructure improvements and speed management
    ii. Vehicle safety
    iii. Work-related road safety
    iv. Road user choices, and
    v. System management.

469. I consider the infrastructure proposed is well aligned with supporting Vision Zero through the design of the SH2 intersection and the wider infrastructure for Lower Hutt central city.

9.1.6 Arataki Version 2

470. Arataki is Waka Kotahi's view on how to deliver the Government objectives for land transport system, and guides implementation through the actions through a wide range of plans, policies and processes led by Waka Kotahi and investment partners. The regional summary for Wellington[10] includes the following key system insights:

    i. Future growth needs to build on high levels of public transport use, walking and cycling to create stronger communities and connect people to employment, education and essential services, including supporting social outcomes for struggling communities in Porirua and the Hutt Valley
    ii. There is a need to shift more people away from private vehicle travel to lower emission transport options, including through the delivery of the Let's Get Wellington Moving (LGWM) programme
    iii. Access to Wellington's port, ferry terminals and airport and the safe, reliable road and rail corridors north of Wellington, are critical to supporting journeys for people and freight
    iv. We need to focus on extracting more benefit from Wellington's existing transport system, through making the most of existing networks, services and demand management
    v. Investment is needed to improve capacity, reliability and resilience for both regional and inter-regional rail journeys
    vi. Wellington is particularly vulnerable to seismic risk and other natural hazards, and sea level rise and more severe storms will increasingly impact on coastal communities, roads and rail infrastructure, and

[10] Waka Kotahi, Arataki, Regional Summary for Wellington. Retrieved online via https://www.nzta.govt.nz/assets/planning-and-investment/arataki/docs/regional-summary-wellington-august-2020.pdf

vii. The region's safety record indicates the need to focus on vulnerable users such as cyclists and pedestrians in the Wellington urban areas, high-risk motorcycle routes and speed on high-risk rural roads.

471. I consider that Riverlink will positively contribute and support wider programmes to address all of the issues identified in the above insights.

9.2 Regional Policy and Strategy

9.2.1 Hutt City Central City Transformation Plan

472. The Central City Transformation Plan is a framework that aims to stimulate and coordinate the thinking around the design and development of the central city. I note that the Transformation Plan is non-statutory, although provides a co-ordinated vision for the development of the Central City for a range of projects and proposals.

473. The Central City Transformation Plan is based on a number of principles and related Project, as below:

i. Gradually concentrate retail within a pedestrian-orientated area bounded by Dudley and Margaret Streets, Queens Drive and Laings Road

ii. Introduce a network of minor roads and lanes including east-west connections that open up the core central city to the river

iii. Create a distinctive and legible route from State Highway 2 across the relocated Melling Bridge at Queens Drive and along Queens Drive to Ewen Bridge

iv. Reconfigure the intersection of Laings Road and Queens Drive

v. Manage pedestrian-vehicle conflict at Margaret Street and other east-west streets and lanes

vi. Provide a broad high-amenity walkway along the stop bank between Ewen and Melling bridges

vii. Encourage high-quality medium-rise apartments with lower levels able to accommodate cafes, restaurants, retail and commerce

viii. Provide east-west connections linking the central city core to the river and beyond, over the river to Alicetown, Melling and the Western Hills

ix. Following the relocation of Melling Bridge, roundabouts are removed, and Melling Link becomes fully part of the local street grid

x. Comprehensive tree planting programme will improve the visual character of the area, and

xi. More emphasis on strip shopping at the intersection of High and Brunswick streets and Melling Road, which could become the nucleus of a future urban village

474. To the extent that is relevant to the scope of my assessment, I consider the Project as proposed is to deliver on all of the transport elements of the Central City Transformation Plan and is an enabler for wider delivery such of the proposed retail concentration through the support for multiple modes of travel.

9.2.2 Wellington Regional Land Transport Plan 2015

475. The current RLTP identifies the current Melling interchange in several areas of the Plan. It identifies the network risk arising from flooding and the effect that would have on both road and rail connections.

476. As part of the plan a strategic response to "*implementing safety, reliability and efficiency improvements to SH2"* describes how consideration should also be given to improving the access to Melling railway station, and the work could be timed to integrate with the flood protection works.

477. I consider that the Project is fully delivering to the response laid out in the RLTP.

9.2.3 Draft Wellington Regional Land Transport Plan 2021

478. In addition, I note that the draft RLTP 2021 identifies three ambitious headline targets in relation to safety, mode shift and carbon emissions. The draft RLTP 2021 includes a longer 30 years outlook and consideration of the integration between transport and landuse.

479. The draft RLTP also sets out the priorities for the next ten years transport investment. These are

i. - Public transport capacity,

ii. Travel Choice,

iii. Strategic access,

iv. Safety,

v. and Resilience.

480. This is shown in Figure 23 below, taken from the Draft RLTP.

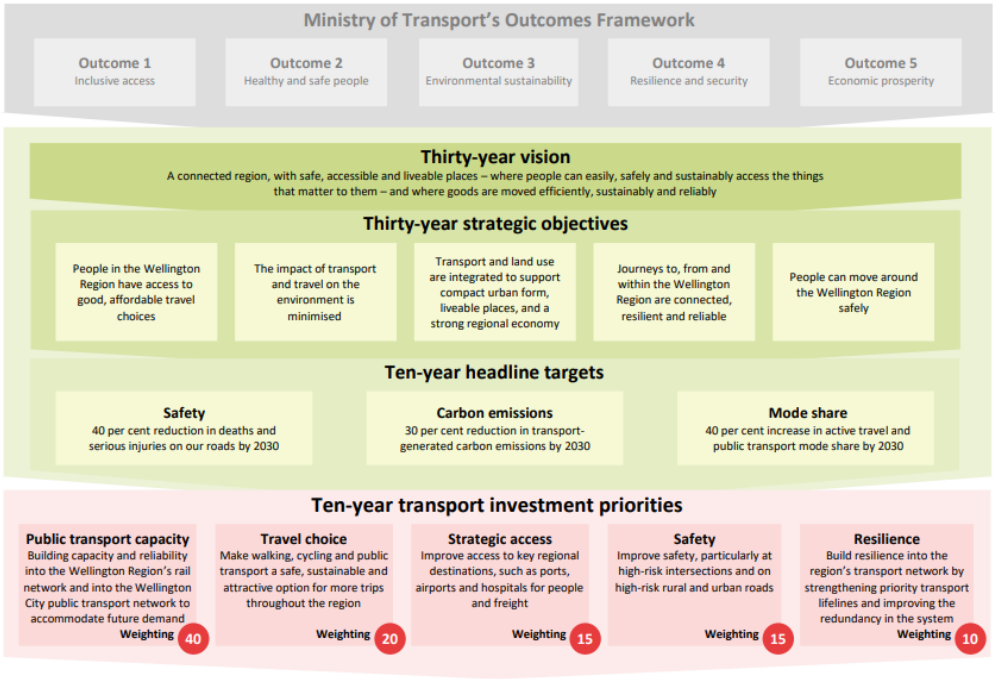


Figure 23 Summary of strategic framework and investment priorities

481. I consider that RiverLink presents an opportunity to positively contribute to a number of these targets and priorities if they are adopted as RLTP 2021.

10 CONCLUSION AND RECOMMENDATIONS

482. Overall I consider that the Project will result in **significant positive** transport and traffic effects once complete. These effects include safety for active transport and for traffic on SH2 at the Melling interchange. There will be significant positive effects on the efficiency of freight and private traffic on SH2 as a result of grade separation replacing the current signalled intersection. The new Melling Station is in a location that is generally more accessible for those wishing to access Lower Hutt central city.

483. There are some adverse effects that I consider will arise from the Project, although I view these to be of a lesser scale than the overall positive effects due to both the lower magnitude and extent of the adverse effects. Examples of these include the increased walk distance to the new Melling Station from Harbour View Road, or the access restrictions to the Brockelsby Roofing Products site.

484. I have identified that the reduction in parking is a key adverse effect of the Project. I have considered that this specific aspect of the Project is a **moderate** adverse effect by considering the reduction in the context of the total parking provision in central Hutt, and not considering the reduction of the scale of the reduction in parking from the Riverbank car park in isolation.

485. The Project is well aligned with all relevant National and Regional Policies and Plans, in part due to the long term planning that has gone into the Project elements being reflected in the development of the local plans.

486. During the construction I do consider there to be several **moderate** adverse effects that will arise. These include the potential for adverse safety effects both from direct construction movements and as a result of traffic diverting onto less suitable routes to avoid delays.

10.1 Summary of mitigations required

487. In order to mitigate the adverse effects described above and in the preceding assessment I have recommended:

i. That a comprehensive review of the management of all public parking (on-street and off-street) within the central area of Lower Hutt is undertaken to develop the optimum allocation of spaces between short and long stay parking.

ii. The frequencies and hours of operation of public transport be increased where required to provide the capacity to support mode shift away from private cars to offset the reduction in available parking.

iii. The development of a Construction Traffic Management Plan (CTMP) which includes consideration of temporary routes for pedestrians and cyclists and limits the delays on SH2 and key routes to minimise safety effects and delays during construction. Site Specific Traffic Management Plans (SSTMP) are required for any specific locations of activities identified in the CTMP, to address the particular circumstances, local traffic and community travel demands within the relevant area.

488. Based on these mitigations, I consider that the effects may still be **significant adverse** in some aspects, although these effects will be mitigated as far as is practicable.

489. My reasoning for this is that the effects of the delays for the closure of Rutherford Street would still be significant, but the duration of these delays is minimised.

490. The operational adverse effects on an area wide basis have been addressed through design, and the risk of potential adverse effects related to the parking reduction can be reduced through the application of the mitigations shown in i and ii above.

23 July 2021

Duncan Tindall

Appendix A - Traffic Modelling Report

The Riverlink Project

Traffic Modelling Memorandum

July 2021

flow
TRANSPORTATION SPECIALISTS

flow
TRANSPORTATION SPECIALISTS

Project:	**The Riverlink Project**
Title:	**Traffic Modelling Memorandum**
Document Reference:	**P:\GHDX\009 Riverlink\reporting\R1B210708_Transport Modelling Report.docx**
Prepared by:	**Julie Liu, Qing Li**
Project Manager	**Ian Clark**
Reviewed by:	**Ian Clark**

Revisions:

Date	Status	Reference	Approved by	Initials
24 May 2021	A - DRAFT	R1A210524	I Clark	IC
08 July 2021	B – Final	R1B210708	I Clark	IC

EXECUTIVE SUMMARY

Flow Transportation Specialists Limited (Flow), as sub consultants to GHD, has been commissioned by Waka Kotahi to carry out traffic modelling to inform the assessment of transport effects for the Riverlink project (the Project).

Assessment Framework

The assessment of the Project has been informed by a series of transport/traffic models, including

- the Wellington Transport Strategic Model (WTSM) from which regional forecast traffic demands have been sourced
- the North Wellington SATURN Model (NWSM), where area wide effects have been assessed, and
- isolated intersection SIDRA traffic models where detailed intersection analysis is required.

The assessment of the Project has assessed the following forecast years

- 2026, to assess the effects of the Project during construction
- 2036, to assess the effects of the Project long term.

Traffic Forecasts

Forecast demands in the NWSM (between the 2018 base year and forecast years) have been derived from outputs obtained from the WTSM.

Forecast growth about the wider area of 0% to 2% per year is predicted between the 2018 Base, 2026 and 2036 NWSM Do Minimum scenarios. This predicted growth rate aligns with the growth rate along SH2 near to the Project.

Small traffic flow increases are predicted on State Highway 2 (SH2) between 2018 and 2026 (0% to 1% per year) with traffic flows about the Hutt City local network predicted to increase at a slightly higher rate (2% to 3%).

Between 2026 and 2036, the NWSM predicts that some traffic will reroute about the Melling area, shifting from Melling Bridge to Ewen Bridge and the Hutt City local roads. This is partly a result of the increased delay at the Melling Link, leading to a slight decrease in traffic on SH2, south of the Melling Link. Increased congestion is predicted on SH2 in both directions, along the Melling Link and the Hutt City local roads. A number of critical movements at the SH2/Melling Link intersections are predicted to be over capacity in the 2036 Do Minimum (having a volume to capacity ratio over 100%).

Project Overview

The Project consists of three separate, but interdependent projects, being

- Flood Protection (Greater Wellington Regional Council), being the widening Te Awa Kairangi/Hutt River channel and berms and raising the height of the stop banks

- Urban regeneration (Hutt City Council), being urban renewal and regeneration through improved access from the CBD to and alongside the river through the creation of a promenade, a new pedestrian bridge, a riverside park and attractive supporting development, and
- Melling Intersection Improvements (Waka Kotahi NZ Transport Agency), being a new grade separated interchange and river bridge at Melling, new intersections with local roads, enhanced pedestrian and cycle routes and better public transport integration at a new Melling Railway Station.

From a transport perspective, the Project comprises of the following network changes

- Reconfiguration of SH2 and Melling Bridge interchange layout with Pharazyn Street, Block Road, Harbour View Road and Tirohanga Road
- Relocation of the landing of Melling Bridge on the Hutt City side, from Rutherford Street and the Melling Link intersection to the Rutherford Street and Queens Drive intersection
- Signalising the following roundabouts, with pedestrian protection also being included
    - Rutherford Street and Melling Link (old Melling Bridge landing)
    - High Street and Melling Link
    - Queens Drive and Rutherford Street (new Melling Bridge landing)
    - Queens Drive and High Street
    - Queens Drive and Ewen Bridge (with no pedestrian phase)
- Changing the control of the following existing roundabouts to priority-control intersections
    - Dudley Street and Andrews Avenue
    - Dudley Street and Margaret Street
- Closing Daly Street, as well as the Daly Street and High Street roundabout
- Installing a signalised pedestrian crossing on Pharazyn Street, connecting the proposed pedestrian bridge to the new Melling railway station
- Allowing for two-way traffic movements on Dudley Street
- Diverting some 60% of traffic associated with the Riverbank car park to other car parks within the Hutt City CBD
- Relocating the Riverbank car park entrance to Rutherford Street, west of the new Melling Bridge landing, with vehicle movements restricted to left in and left out only
- Signalising the Marsden Street, Victoria Avenue and Railway Avenue intersections with pedestrian protection.

Predicted network response as a result of the Project

The assessment on the transport network has used the 2036 forecast year for predicting the effects associated with the Project. Using the NWSM, the following has been assessed, comparing the 2036 Do Minimum with the 2036 Project.

Traffic volumes are predicted to

- increase in both directions on SH2 between the Dowse interchange and Fairview Drive
- increase across the new Melling Bridge, with reductions on the Ewen Bridge
- decrease on the local network such as Railway Avenue/ Ewen Bridge, along Marsden Street and Harcourt Werry Drive due to the additional capacity provided at the Melling interchange
- divert from Melling Link to Queens Drive due to relocating the Melling Bridge landing, which will lead to a significant flow increase on Queens Drive between Rutherford Street and High Street
- decrease within Hutt City CBD due to the network accommodating active transport modes, such as at High Street north of Pretoria Street
- increase about the Hutt City CBD fringe, such as Kings Crescent and Knight Road, with traffic volumes on Margaret Street and Andrews Avenue increasing significantly, as a result of Dudley Street becoming a two-way street and the relocation of Riverbank car park demands.

Predicted Levels of Service (LOS) about the Project include

- LOS D and LOS C are predicted in the morning peak period at the two intersections at the SH2/Melling interchange, while LOS C is predicted for both intersections during the evening peak. Several turning movements are predicted to operate at LOS E, but all movements are predicted to operate within capacity, with the maximum volume to capacity ratio being 84% in the morning peak and 90% in the evening peak
- LOS B, C and D are predicted at the local road intersections within the Hutt City area, highlighting that the intersections are predicted to operate within capacity.

Travel time and travel time reliability on SH2 is predicted to improve, due to the proposed grade separated interchange introduced with the Project. Changes in travel times are predicted to

- Improve on SH2 mainline southbound by 4 minutes and 2 minutes during the morning and evening peak periods respectively
- Improve on SH2 mainline northbound by 1.5 minutes during the morning peak
- Improve for outbound traffic from Hutt City (both sides of the City) along SH2, by 2 to 3 minutes in the morning peak and 3 to 5 minutes in the evening peak.
- Improve slightly for inbound traffic travelling towards Hutt City by some 1 minute from SH 2 south and less than 1 minute from SH2 north, in both peak periods.

While the above outputs focus on traffic performance, the Project includes improvements to active mode (walking and cycling) users, with pedestrian protection being provided at the new Melling interchange and at all proposed signalised intersections within the Hutt City CBD. These improvements encourage the use of active modes and provides a safer environment for those who walk and cycle.

Sensitivity Tests

Two set of sensitivity tests have been assessed, as set out below

- **Additional Rail Investment**. Using WTSM, this test has been completed to ascertain the effects of excluding Rail Investment Scenario 2 (RS2) from the traffic demands. This test indicates minimal changes in traffic demands about the Melling and Hutt City area
- **Additional improvements along SH2**. This test considered removing the signalised intersections along SH2 to allow free flow movements at the Grounsell Crescent and Fairway Drive intersections. Volumes on local roads north of Hutt City are predicted to decrease and reroute to SH2. An increase in daily traffic volumes is predicted on SH2 in both directions north of the Melling interchange. The demands south of Melling Link however, appear to remain similar due to the delays predicted at the SH2/Petone Interchange and SH2/Dowse Interchange.

Construction Staging Assessment

The assessment indicates that the transport effects predicted during the construction of the Project are expected to be

- Reduction in traffic volumes on SH2, as motorists avoid predicted increases in travel times along SH2 caused by the reduction in capacity through the area of the Construction Traffic Management Plan
- Increase in traffic about the adjacent local road network
- Travel times on SH2 are predicted to increase by around 5-6 minutes southbound in the morning peak, with all temporary scenarios, with northbound travel times predicted to increase by a minute during the evening peak). These increases are due to the assumptions relating to reduced speed limits and reduced capacity along SH2, in the vicinity of the existing Melling intersections (those with Melling Link and Block Road)
- The effects of Construction Scenarios 2 and 3 are predicted to be greater, due to the temporary works anticipated within the Hutt Centre (in addition to those along SH2). These effects may be mitigated by retaining the existing roundabout layouts at the Melling Link/Rutherford Street and Melling Link/High Street intersections during the construction period along SH2, until the new Melling Link connection to Queens Drive is completed.

CONTENTS

APPENDICES

1 INTRODUCTION

Flow Transportation Specialists Limited (Flow), as sub consultants to GHD, has been commissioned by Waka Kotahi to carry out traffic modelling to inform the assessment of transport effects for the Riverlink project (the Project).

This Traffic Modelling Memorandum is not intended to be a full Assessment of Transport Effects for the Project. It is intended to sit within the Assessment of Transport Effects being prepared by GHD.

2 TRANSPORT MODELLING FRAMEWORK

The assessment of the Project has been informed by a series of transport/traffic models, including

- the Wellington Transport Strategic Model (WTSM), from which regional forecast traffic demands have been sourced
- the North Wellington SATURN Model (NWSM), where area wide effects have been assessed, and
- isolated intersection SIDRA traffic models where detailed intersection analysis is required.

Each of the models are discussed below.

2.1 Wellington Transport Strategic Model (WTSM)

The WTSM is developed and operated by the Wellington Analytics Unit (WAU). The model has been used as the basis for most, if not all transport projects and evaluations in the Wellington Region for several years. The model was originally developed about 20 years ago, but the most recent version was validated to 2013 flows and conditions[1].

WTSM is a four stage transport model, meaning that it considers trip generation (by all modes), trip distribution, mode split and assignment. It uses population and employment inputs to model changes in travel demands and travel patterns resulting from infrastructure and policy interventions.

The future model years used for this study are

- 2026 to consider the effects of the construction phase of the Project, and
- 2036 to consider the effects of the operation of the Project, relative to the future Do Minimum scenario (i.e. a scenario without the project).

WTSM has been used to provide forecast traffic demands for these future years, without and with the Project, to the North Wellington SATURN Model (NWSM) as discussed below.

2.2 North Wellington SATURN Model (NWSM)

The NWSM has been used for the assessment of several transport projects, including the Transmission Gully and Petone to Grenada projects.

[1] An update to the model is currently underway, ensuring that the model is validated to 2018 flows and conditions

The model covers the entire Wellington region, although a significant proportion of the network is represented as what SATURN calls "buffer", being link based only. The core part of the model is at what SATURN calls "simulation" which includes full intersection, turn based coding, and this simulation includes the effects of capacity constraint. That means that the assessment of forecast delays is based on the flow that is predicted to reach a particular bottleneck, i.e. the arrival flows, rather than the demand flows.

2.2.1 Base Model

The base NWSM was originally validated to a base year of 2011.

The model was updated in 2019 and satisfactorily validated to a base year of 2018, with this model being peer reviewed by Transport Futures Ltd.

It is accepted that the current version of the model was developed primarily to assess the effects of the Transmission Gully project. Traffic volume checks were carried out at key locations of interest for the Transmission Gully project, such as on Melling Link and Ewen Bridge, with travel time checks on SH2. We note however that the Project area was not the main focus of the work in late 2019.

For this study, the local network about Hutt City has been validated to surveyed traffic counts. This has included modifying traffic demands and the loading of traffic within the City, along with modifying speed limits. We note that the model convergence criteria have been satisfied.

The model was originally developed (in 2011) with three time periods, being weekday morning peak, inter peak and evening peak. For the model update (2018 base year), only the morning and evening peak models were updated. The modelled peak hours are 7:30 to 8:30 in the morning peak and 4:30 to 5:30 in the evening peak.

This assessment considers the operation of the network during the two modelled periods, plus it considers daily flows. These have been derived by factoring the morning and evening peak flows by a factor of 5, as checks indicate that this factor provides a reasonable approximation.

The NWSM has two "user classes" representing light and heavy vehicles. The modelled flows in this report are therefore provided as "passenger car units" or PCUs, with heavy vehicles assumed to represent two cars.

2.2.2 Forecast Models

As noted above, this study has used forecasts for the Do Minimum scenario for years 2026 (construction assessment) and 2036 (Project effects assessment).

Forecast demands in the NWSM (between the 2018 base year and forecast years) have been derived from outputs obtained from the WTSM.

Details of the network assumptions are included at Section 3 below.

2.3 SIDRA Models

The operation of various intersections about Hutt City have been assessed using SIDRA.

SIDRA model assessments have relied on forecast traffic volumes from the NWSM for 2036. With the NWSM traffic volume outputs representing PCUs, the SIDRA models have assumed 0% HCVs.

2.4 PARAMICS Model

We note that the design of the SH2 Melling interchange has made use of a local area PARAMICS model to consider the effects of queueing back between closely spaced intersections, and the effects of platooning, considering a variety of signal phasing arrangements and lane allocations.

This assessment does not rely on this PARAMICS model, and instead assesses the forecast operation of the intersections based on the SIDRA analysis.

3 DO MINIMUM SCENARIO

3.1 Wellington Transport Strategic Model (WTSM)

3.1.1 Land Use Assumptions

This assessment refers to a version of WTSM which is being used for all current studies, such the Let's Get Wellington Moving projects. Key to the assessment is the land use assumptions.

The current land use assumptions are developed by the WAU drawing upon projections developed for the territorial authorities as of November 2019. The key population and employment assumptions are set out in Tables 1 and 2.

Table 1: Existing and Forecast Population

	2013	2018 (Estimate)	2036
Wellington City	200,300	211,900 (0.8%)	240,800 (0.8%)
Lower Hutt	101,100	107,600 (0.9%)	116,600 (0.6%)
Upper Hutt	41,400	45,300 (1.3%)	47,300 (0.6%)
Porirua, Kapiti, Wairarapa	146,800	160,800 (1.4%)	192,900 (1.3%)
Region	489,600	525,600 (1.1%)	597,600 (0.9%)

Table 2: Existing and Forecast Employment

	2013	2018 (Estimate)	2036
Wellington City	137,200	145,600 (0.9%)	168,500 (0.9%)
Lower Hutt	40,500	42,600 (0.7%)	46,100 (0.6%)
Upper Hutt	11,300	16,400 (6.4%)	20,000 (3.1%)
Porirua, Kapiti, Wairarapa	46,600	50,700 (1.3%)	57,500 (0.9%)
Region	235,600	251,200 (0.9%)	284,700 (0.8%)

Almost half of the additional 3,500 jobs indicated for Lower Hutt between 2018 and 2036 are predicted to take place within the Hutt Centre.

3.1.2 Transport Investment Assumptions

As noted above, the version of WTSM used for the assessment of this Project is consistent with that used for other studies. The following changes have been included in the WTSM Do Minimum scenario.

Table 3: Transport Investment Assumptions in WTSM

Type of Investment	Project Details
State Highways	Transmission Gully
	Peka Peka to Otaki
	Otaki to North levin
	Cobham Drive crossing
Public Transport	Integrated Ticketing
	Regional Rail Plan RS1 (Note Scenario RS2 is not included as this investment is not committed)
	Modest improvement in bus frequencies to match capacity with demand
	Additional bus service frequencies and improved travel times enabled by City Streets project
Active modes	WCC Cycle Masterplan plus additional measures due to City Streets
Travel Demand Management	Modest change due to travel plans, changes to parking, some work from home, etc, equating with about 3% reduction in car based commuter trips

3.2 North Wellington SATURN Model (NWSM)

3.2.1 Traffic Volumes

As noted above, traffic volumes represented within the NWSM are informed by the WTSM. As such, the traffic demands predicted following the four-stage process of the WTSM are extracted and placed into the NWSM.

3.2.2 Network Changes

The network changes in the NWSM are consistent with those in the WTSM. Most of the changes set out in **Error! Reference source not found.** are included within the NWSM (in some case implicitly, as m easures such as integrated ticketing will affect the forecast demands coming through from WTSM). The main network change in the NWSM of relevance to this assessment relates to the assumed completion of the Transmission Gully project (now assumed to be complete late in 2021). In addition, the safety works currently under way along SH58 are included.

The existing layouts at the SH2 Melling intersections (both the Melling Link and Block Road intersections) are assumed in both the 2026 and 2036 Do Minimum scenarios.

It should be noted that the Petone to Grenada project has not been included, as this is not a committed project.

In Hutt City CBD, the existing road layouts and intersections have been assumed to be retained in the 2036 Do Minimum scenario. However, the speed limit of High Street has been reduced from 50 to 40 km/hr.

3.3 Forecast Traffic Volumes

Predicted average annual daily traffic (AADT) volumes, as predicted in the NWSM for the 2018 Base, 2026 and 2036 Do Minimum are set out in Table 4, in terms of annual average daily traffic (AADT) flows.

Table 4: Predicted Daily Traffic Volumes (two way), with annual % growth in brackets

Road	2018 Base	2026 Do Min (Percentage Increase per year)	2036 Do Min (Percentage Increase per year)
SH2 North of Block Road	45,910	49,850 (1%)	49,070 (0%)
SH2 South of Melling Bridge	49,030	50,760 (0%)	50,390 (0%)
Melling Bridge	26,270	27,890 (1%)	24,450 (-1%)
Harbour View Road	2,760	2,750 (0%)	2,840 (0%)
Tirohanga Road	1,630	1,800 (1%)	1,840 (0%)
Block Road	7,540	8,420 (1%)	6,940 (-2%)
Pharazyn Street	7,010	7,830 (1%)	7,090 (-1%)
Ewen Bridge	35,040	40,610 (2%)	44,960 (1%)
Rutherford Street	12,780	14,640 (2%)	17,630 (2%)
High Street	6,070	7,630 (3%)	6,230 (-2%)
Queens Drive	6,000	7,270 (3%)	7,210 (0%)

The above daily traffic volume predictions indicate

- Growth along SH2 is expected to be
    - 0 to 1% per year between 2018 and 2026 (primarily due to land use change plus the Transmision Gully project), and
    - 0 or -1% per year between 2026 and 2036. This lack of growth is likely to be a result of congested conditions.
- Growth across Ewen Bridge and local roads within Hutt City CBD is expected to be
    - 2 to 3% per year between 2018 and 2026
    - 0 to 2% per year between 2026 and 2036. The daily traffic flow on High Street is predicted to decrease slightly due to the reduced speed limit.

As the base NWSM was validated to 2018 conditions, in order to check the validity of the forecast changes in demands, we have carried out a brief check of actual growth in recent years.

The observed traffic growth along SH2 near Melling Interchange has been calculated using the data obtained from Waka Kotahi's Traffic Monitoring System. Daily traffic volumes on SH2 from 2012, 2016 and 2018 have been obtained, and these are summarised in Table 5.

Table 5: Actual Traffic Growth - SH2

Road	2012	2016 (Percentage Increase per year)	2018 (Percentage Increase per year)
SH2 North of Fairview Road	36,450	36,400 (0%)	41,600 (2%)
SH2 south of Melling Link	37,450	39,050 (1%)	42,950 (2%)

Based on the above, the actual growth rate along SH2 has been 0% to 2% about the project area. While past growth should not be taken to necessarily represent future growth, it is relevant to note that the recent rate of growth is close to the predicted growth rates presented in Table 5.

To understand the daily traffic volume changes predicted about the wider area, predicted daily traffic volume comparisons have been obtained from the NWSM. In the following plots, the bandwidths in green represent the locations where daily traffic volumes are predicted to increase, while the blue bandwidths indicate predicted decreases in daily traffic volumes. Figure 1 presents the differences in daily traffic volumes between the base year (2018) and forecast Do Minimum (2026), with Figure 2 presenting the differences in predicted daily traffic volumes between the forecast Do Minimum of 2026 and 2036.

The NWSM predicts moderate traffic volume increases on SH2 between 2018 and 2026. For example, the predicted daily volume on SH2 northeast of the Melling intersection is predicted to increase from 45,900 PCUs per day (two way) in 2018, to 49,850 PCUs day in 2026.

Growth in traffic volumes is also predicted about the Hutt City local network. For example, the daily traffic volumes on Rutherford Street and High Street are predicted to increase from 12,800 PCUs per day to 14,650 PCUs per day and 6,050 PCUs per day to 7,650 PCUs per day respectively.

A comparison of daily traffic volume predictions between 2026 and 2036 indicates some traffic will reroute about the Melling area, shifting from Melling Bridge to Ewen Bridge and the Hutt City local roads. This is partly a result of the forecast increases in delays at Melling Link, leading to a slight decrease in daily traffic volumes on SH2 south of the Melling Link, from 50,750 PCUs per day in 2026 to 50,400 PCUs per day in 2036.

Traffic volumes are predicted to decrease from 27,900 PCUs per day in 2026 to 24,450 PCUs per day in 2036 across the Melling Bridge, whereas traffic volumes travelling across the Ewen Bridge are predicted to increase from 40,600 PCUs per day to 44,950 PCUs per day, and increase from 14,650 PCUs per day to 17,650 PCUs per day on Rutherford Street.

Figure 1: Predicted Daily Traffic Volume Comparisons between 2018 Base Year and 2026 Do Minimum Model

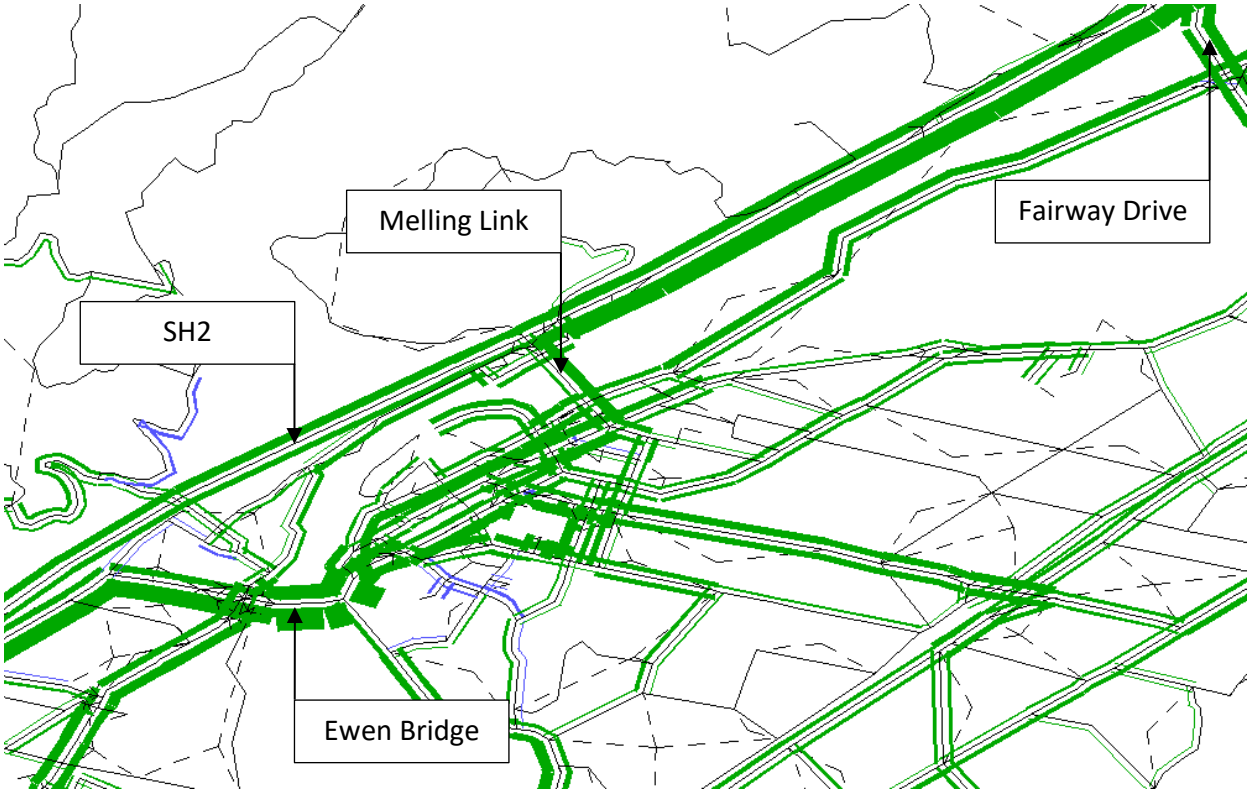


Figure 2: Predicted Daily Traffic Volume Comparisons between 2026 Do Minimum and 2036 Do Minimum Model

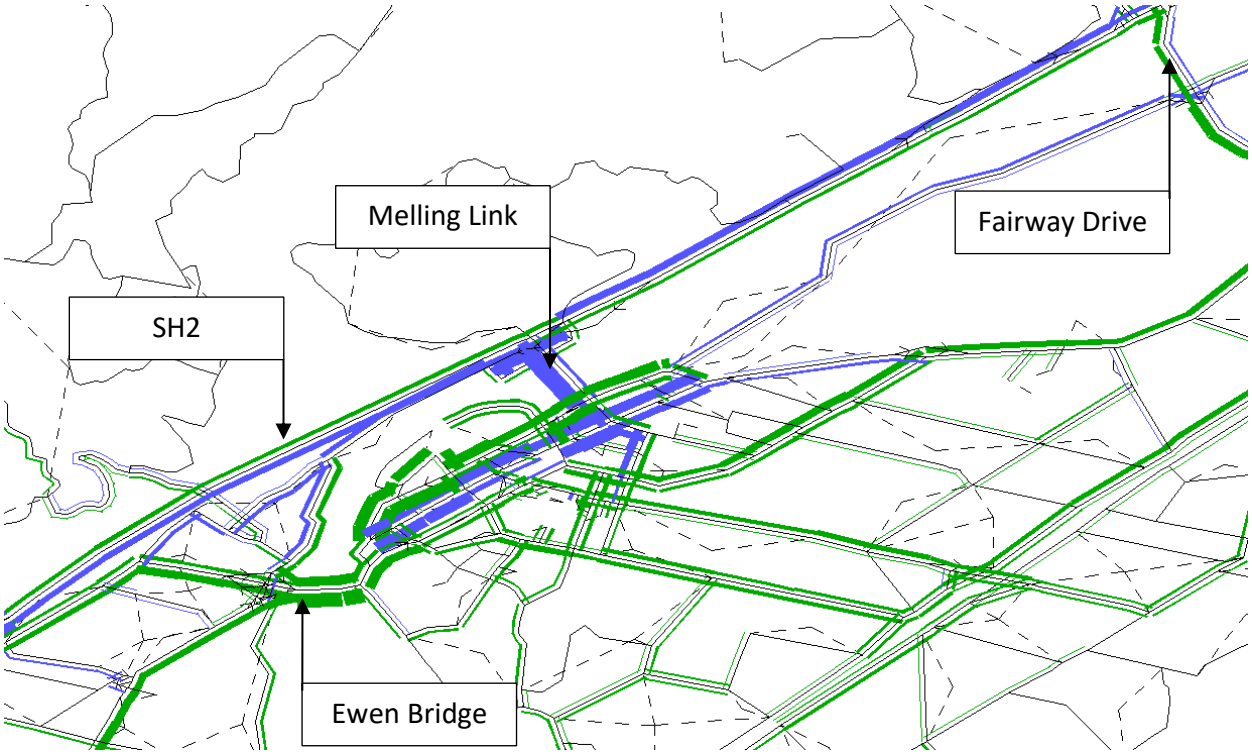


Table 6 identifies the changes in forecast demands to and from the Hutt City CBD.

Table 6: Existing and Forecast Traffic Demand to and from Hutt City CBD, with annual % growth in brackets

	2018		2026 (Percentage Increase per year)		2036 (Percentage Increase per year)	
	AM	PM	AM	PM	AM	PM
To Hutt City CBD	1,850	1,450	2,550 (5%)	2,100 (6%)	2,850 (3%)	2,400 (4%)
From Hutt City CBD	800	2,750	1,050 (4%)	3,800 (5%)	1,450 (5%)	4,200 (3%)

3.4 Do Minimum Operation

The delay plots at Appendix A set out the forecast delays in the Melling area, for the 2018 Base, 2026 and 2036 Do Minimum scenarios, as predicted in the NWSM. The following points are noted

- In the morning peak, moderate delays are predicted on the SH2 southbound approach in the 2018 base model. In 2026 and 2036, southbound delays on SH2 at the Melling Link interchange are predicted to slightly increase from 100 seconds to 110 seconds and 105 seconds respectively. Northbound delays on SH2 at the interchange are predicted to increase from 60 seconds to 90 seconds and 80 seconds for 2026 and 2036 respectively. We note that the delays on SH2 are predicted to reduce slightly between 2026 and 2036. This is likely to be a result of traffic re-routing from Melling interchange to Ewen Bridge and other local streets, due to an increase in congestion being predicted on SH2 in both directions
- Similar to the morning peak, delays experienced by vehicles travelling on SH2 are predicted to increase in the evening peak, particularly in the northbound direction. Delays of 65 seconds and 80 seconds are predicted on the SH2 east approach in the 2026 and 2036 evening peak models, respectively. In addition, increased delays and queues are also predicted on the Melling Link north of Rutherford Road in the evening peak, indicating that the observed evening peak queues on Melling Link will worsen as a result of the increased traffic northbound
- In 2036 at the SH2/Melling Link intersection, the predicted volume to capacity (V/C) ratios for the SH2 southbound through movement and the northbound right turn movement are over 100% in both the morning and evening peak periods. On the Melling Link approach, a V/C ratio of 100% is predicted for left turning traffic in the morning peak period, with a V/C over 100% being predicted for the through and right turn movements in the evening peak
- Southbound queues on SH2 are predicted to spillback to the SH2/ Block Road intersection in the morning peak, with a V/C ratio of over 100% for the southbound through movement. In the evening peak, a V/C ratio of over 100% is predicted for both through and right turn movements on the approach from Block Road.

4 THE PROJECT

The Project consists of three separate, but interdependent projects, being

- Flood Protection (Greater Wellington Regional Council), being the widening Te Awa Kairangi/Hutt River channel and berms and raising the height of the stop banks
- Urban regeneration (Hutt City Council), being urban renewal and regeneration through improved access from the CBD to and alongside the river through the creation of a promenade, a new pedestrian bridge, a riverside park and attractive supporting development, and
- Melling Intersection Improvements (Waka Kotahi NZ Transport Agency), being a new grade separated interchange and river bridge at Melling, new intersections with local roads, enhanced pedestrian and cycle routes and better public transport integration at a new Melling Railway Station.

From a transport perspective, the Project comprises of the following network changes

- Reconfiguration of SH2 and Melling Bridge interchange layout with Pharazyn Street, Block Road, Harbour View Road and Tirohanga Road
- Relocation of the landing of Melling Bridge on the Hutt City side, from Rutherford Street and the Melling Link intersection to the Rutherford Street and Queens Drive intersection
- Signalising the following roundabouts, with pedestrian protection also being included
    - Rutherford Street and Melling Link (old Melling Bridge landing)
    - High Street and Melling Link
    - Queens Drive and Rutherford Street (new Melling Bridge landing)
    - Queens Drive and High Street
    - Queens Drive and Ewen Bridge (with no pedestrian phase)
- Changing the control of the following existing roundabouts to priority-control intersections
    - Dudley Street and Andrews Avenue
    - Dudley Street and Margaret Street
- Closing Daly Street, as well as the Daly Street and High Street roundabout
- Installing a signalised pedestrian crossing on Pharazyn Street, connecting the proposed pedestrian bridge to the new Melling railway station
- Allowing for two-way traffic movements on Dudley Street
- Diverting some 60% of traffic associated with the Riverbank car park to other car parks within the Hutt City CBD
- Relocating the Riverbank car park entrance to Rutherford Street, west of the new Melling Bridge landing, with vehicle movements restricted to left in and left out only
- Signalising the Marsden Street, Victoria Avenue and Railway Avenue intersections with pedestrian protection.

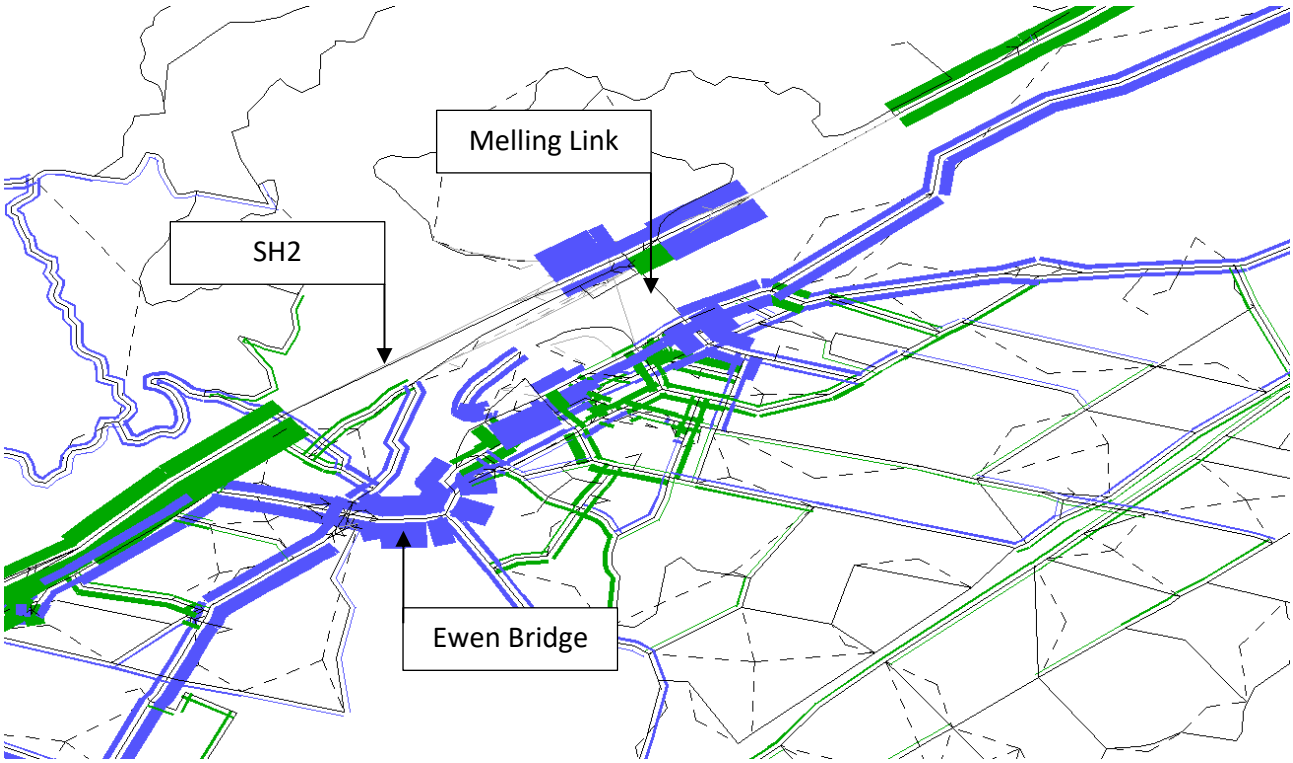
5 ASSESSMENT OF THE PROJECT

The assessment of the Project focusses on the predicted changes modelled in the NWSM 2036 forecast, with comparisons of traffic volumes, travel times and local area changes being presented.

5.1 Daily Traffic Volume Changes

The predicted daily traffic volumes have been compared between the 2036 Do Minimum and 2036 Project scenarios, as modelled within the NWSM. A traffic volume difference plot is provided, where green bands represent the locations about the immediate network where daily traffic volumes are predicted to increase as a result of the Project, with blue bandwidths indicating where daily traffic volumes are predicted to decreases.

Figure 3: Daily Flow Comparisons between 2036 Do Minimum and 2036 Project



It is important to note, when looking at the above, that the plot does not show traffic volume differences where the modelled networks are different between the two scenarios (i.e. at or very close to the Melling interchange). This explains the (erroneous) wide blue bands on SH2, northeast of the Melling interchange, in Figure 3, and no traffic volume differences on Melling Link. Details of the traffic volume differences at these locations is provided in Table 7 and in the text that follows. A full list of key locations about the Project is included in Appendix B.

Table 7: 2036 Daily Traffic Volumes for Do Minimum and the Project (PCUs per day)

Road	Section	2018 Base	2036 Do Min	2036 Scheme
Melling Bridge	Both directions	26,250	24,450	31,500
Tirohanga Road	Both directions	1,650	1,850	1,650
State Highway 2 (southbound)	North of Melling Link	22,700	25,750	28,200
	Melling Link – Normandale Road	23,150	22,900	28,800
	South of Petone	39,200	44,700	44,550
State Highway 2 (northbound)	North of Melling Link	23,200	23,350	25,850
	Melling Link – Normandale Road	25,850	27,500	30,900
	South of Petone	44,700	48,500	48,200
Rutherford Street	Pretoria Street – Queens Drive, both directions	12,800	17,650	14,650
	Queens Drive – Margaret Street, both directions	8,750	11,650	9,850
High Street	North of Pretoria Street, both directions	7,050	5,500	4,500
	Raroa Road – Queens Drive, both directions	6,050	4,650	5,500
Queens Drive	Rutherford Street – High Street, both directions	6,000	8,200	14,050
	Waterloo Road – Margaret Street, both directions	2,550	4,950	6,150
Daly Street	Rutherford Street – Andrews Avenue, both directions	3,900	6,050	n/a
Dudley Street	Margaret Street – Andrews Avenue (westbound)	5,000	8,250	3,000
	Andrew Avenue – Margaret Street (eastbound)	n/a	n/a	1,300
Margaret Street	Dudley Street – High Street, both directions	350	1,650	2,600
	High Street – Queens Drive, both directions	100	200	1,500
Knights Road	Bloomfield Terrace – Cornwall Street, both directions	12,450	13,750	13,700
Laings Road	Queens Drive – Myrtle Street, both directions	1,700	1,250	1,900
Woburn Road	Queens Drive – Myrtle Street, both directions	18,800	19,350	17,550
Ewen Bridge	Both directions	35,050	44,950	34,000
Railway Avenue	Aglionby Street – Herbert Street, both directions	18,000	23,400	18,550
Marsden Street	Bridge Street – Pharazyn Street, both directions	4,350	5,000	3,500
Pharazyn Street	Bridge Street – Marsden Street, both directions	2,850	2,350	3,200
	Marsden Street – Block Road, both directions	7,550	6,950	6,350
State Highway 2 Interchange	Between on and off ramps, both directions	n/a	n/a	20,600

As a result of the Project, the NWSM predicts daily traffic volumes (between the 2036 Do Minimum and 2036 Project) to

- increase in both directions on SH2 between the Dowse interchange and Fairview Drive. Daily traffic flows on SH2 north of the Melling interchange are predicted to increase by approximately 5,000 PCUs per day (two-way) and increases of some 9,300 PCUs per day are predicted between Melling link and Normandale Road
- increase across the new Melling Bridge (+7,000 PCUs per day), with reductions on the Ewen Bridge (-10,950 PCUs per day)
- decrease on the local network such as Railway Avenue/ Ewen Bridge, along Marsden Street and Harcourt Werry Drive due to the additional capacity provided at the Melling interchange
- divert from Melling Link to Queens Drive due to relocating the Melling Bridge landing, which will lead to a significant flow increase on Queens Drive between Rutherford Street and High Street (+5,850 PCUs per day)
- decrease within Hutt City CBD due to the network accommodating active transport modes, such as at High Street north of Pretoria Street (-1,000 PCUs per day)
- increase about the Hutt City CBD fringe, such as Kings Crescent and Knight Road, with traffic volumes on Margaret Street and Andrews Avenue increasing significantly, as a result of Dudley Street becoming a two-way street and the relocation of Riverbank car park demands.

The following table identifies the changes in forecast daily traffic volumes at the SH2 Dowse Drive interchange on and off ramps. Dowse Interchange and Petone Interchange are predicted to operate within capacity during the morning and evening peak periods, with the Project.

Table 8: 2036 Predicted Daily Traffic Volumes for Do Minimum and with the Project (in PCUs) at Dowse Interchange

Intersection	Approach	2036 Do Minimum		2036 Scheme	
		AM	PM	AM	PM
Dowse Interchange	Northbound Off-ramp	850	650	700	550
	Northbound On-ramp	150	500	350	550
	Southbound Off-ramp	300	250	650	500
	Southbound On-ramp	900	1,300	850	900

Travel time and travel time reliability on SH2 is predicted to improve, due to the proposed grade separated interchange introduced with the Project. The Project is predicted to increase the amount of traffic into the Melling area.

5.2 Travel Time Changes

The predicted travel times about the immediate network have been assessed. Travel times have been compared for the following routes

- SH2, north of the SH2 Priests Avenue intersection (Petone), to the north of the SH2 Grounsell Crescent intersection (Belmont)

- SH2, north of SH2 Priests Avenue intersection (Petone) to the Melling Link/Rutherford Street intersection (Lower Hutt), and
- SH2, north of SH2 Grounsell Crescent intersection (Belmont) to the Melling Link/Rutherford Street intersection (Lower Hutt).

The predicted travel times are set out in Table 9. To help highlight the predicted change in travel times between the Do Minimum and the Project, the following colour codes have been applied.

Decreases under 1 minute	Increases under 1 minute
Decreases between 1 and 3 minutes	Increases between 1 and 3 minutes
Decreases over 3 minutes	Increases over 3 minutes

Table 9: Predicted travel times - 2036 Do Minimum and the Project

Route	2036 Do Minimum		2036 With Project	
	AM	PM	AM	PM
SH2 South to North	5 min 40 sec	5 min 55 sec	4 min 10 sec	5 min 20 sec
SH2 North to South	22 min 05 sec	6 min 15 sec	17 min 50 sec	4 min 25 sec
SH2 South to Lower Hutt	6 min 30 sec	6 min 15 sec	5 min 20 sec	5 min 05 sec
Lower Hutt to SH2 South	19 min 20 sec	6 min 45 sec	16 min 50 sec	3 min 45 min
Lower Hutt to SH2 North	4 min 30 sec	9 min	3 min 30 sec	3 min 30 sec
SH2 North to Lower Hutt	4 min 25 sec	2 min 45 sec	4 min 20 sec	3 min 15 sec

Travel time and travel time reliability on SH2 is predicted to improve, due to the proposed grade separated interchange introduced with the Project. Travel times are predicted to

- Improve on SH2 mainline southbound by 4 minutes and 2 minutes during the morning and evening peak periods respectively
- Improve on SH2 mainline northbound by 1.5 minutes during the morning peak
- Improve for outbound traffic from Hutt City (both sides of the City) along SH2, by 2 to 3 minutes in the morning peak and 3 to 5 minutes in the evening peak.
- Improve slightly for inbound traffic travelling towards Hutt City by some 1 minute from SH 2 south and less than 1 minute from SH2 north, in both peak periods.

5.3 Local Traffic Effects

5.3.1 SH2/Melling Interchange

The performance of the SH2/Melling Link interchange is summarised in Table 10, based on the detailed SIDRA outputs being provided in Appendix C.

Table 10: SIDRA modelling outputs of SH2/Melling Link interchange - 2036 with the Project

Approach	Movement	Morning Peak			Evening Peak		
		V/C Ratios	Level of Service	95th percentile queues (m)	V/C Ratios	Level of Service	95th percentile queues (m)
Northern Intersection							
Melling Link South	Through	8%	A	5	25%	A	25
	Right	12%	C	30	53%	C	100
Harbour View Road	Left	68%	E	50	74%	E	30
	Through	68%	E	50	74%	E	30
SH2 off-ramp (Eastbound)	Left	9%	D	15	11%	C	20
	Right	82%	D	185	65%	D	150
Overall Intersection		82%	D	185	74%	C	150
Southern Intersection							
Melling Link South	Left (to Pharazyn Street)	40%	C	55	86%	C	150
	Left (to SH2 south)	40%	C	60	86%	C	150
	Through	16%	B	15	90%	D	180
SH2 off-ramp (Westbound)	Left	81%	D	150	55%	C	80
	Through	79%	E	115	83%	E	100
	Right	14%	D	15	65%	E	35
Melling Link North	Through	59%	A	45	53%	A	50
	Right (to Pharazyn Street)	79%	E	60	70%	E	30
	Right (to SH2 south)	79%	E	60	70%	E	30
Pharazyn Street	Left (to SH2 south)	3%	B	5	3%	B	5
	Left (to Melling Link)	39%	E	25	82%	E	65
	Right	84%	E	45	82%	E	50
Overall Intersection		84%	C	45	90%	C	180

The SH2 and Melling Link interchange is predicted to operate

- at LOS D (northern intersection) and LOS C (southern intersection) during the morning peak. A number of movements are predicted to operate at LOS E, but no movements are predicted to operate at LOS F. The highest predicted V/C ratio is 84% across all movements
- at LOS C during the evening peak. Like the morning peak, several movements are predicted to operate at LOS E, with no movements predicted to operate at LOS F. The through movement on the Melling Link South approach has the highest V/C ratio, at 90%.

5.3.2 Hutt City Intersections

The performance of key intersections about Hutt City are summarised in Table 11 to Table 15, with the detailed SIDRA outputs being provided at Appendix C. Intersections assessed include

- Rutherford Street / Melling Link (Old bridge landing) – Table 11
- High Street / Melling Link – Table 12
- New Melling Bridge landing/ Rutherford Street/ Queens Drive – Table 13
- High Street/ Queens Drive – Table 14
- Ewen Bridge/ Queens Drive – Table 15

Table 11: SIDRA intersection performance of Rutherford Street/Melling Link (old bridge landing), with the Project

Approach	Morning Peak			Evening Peak		
	V/C Ratios	Level of Service	95th percentile queues (m)	V/C Ratios	Level of Service	95th percentile queues (m)
Melling Link South	14%	C	5	10%	C	10
Rutherford Street East	40%	B	55	24%	A	40
Rutherford Street West	65%	B	105	80%	B	230
All vehicles	65%	B	105	80%	B	230

The following points are noted for the Rutherford Street/Melling Link intersection

- No significant issues are predicted, with LOS B being predicted for both peak periods
- The maximum V/C ratio is 80% on the Rutherford Street west approach (through movement). This occurs during the evening peak period.

Table 12: SIDRA intersection performance of High Street/Melling Link, with the Project

Approach	Morning Peak			Evening Peak		
	V/C Ratios	Level of Service	95th percentile queues (m)	V/C Ratios	Level of Service	95th percentile queues (m)
Pretoria Street	8%	C	5	63%	C	45
High Street East	60%	C	35	44%	C	40
Melling Link North	60%	C	50	5%	C	5
High Street West	29%	C	15	68%	C	60
All vehicles	60%	C	50	68%	C	60

No significant issues are predicted at the High Street/Melling Link intersection, with LOS C being predicted for both the morning and evening peak periods.

Table 13: SIDRA intersection performance of New Melling Bridge Landing/Rutherford Street/Queens Drive, with the Project

Approach	Morning Peak			Evening Peak		
	V/C Ratios	Level of Service	95th percentile queues (m)	V/C Ratios	Level of Service	95th percentile queues (m)
Queens Drive	56%	D	50	92%	D	190
Rutherford Street East	88%	D	60	92%	D	110
Melling Link North	93%	C	260	95%	D	165
Rutherford Street West	15%	C	20	94%	E	185
All vehicles	93%	D	260	95%	D	190

The following points are noted for the New Melling Bridge landing/Rutherford Street/Queens Drive intersection

- In the morning peak, overall performance is predicted to be LOS D, with the maximum V/C ratio predicted to be 93% (the through movement from Melling Link north approach)
- In the evening peak, LOS E is predicted on the Rutherford Street (west approach) with a maximum V/C ratio of 94% for the left turn movement. LOS D is predicted on all other approaches.

Table 14: SIDRA intersection performance of High Street/Queens Drive, with the Project

Approach	Morning Peak			Evening Peak		
	V/C Ratios	Level of Service	95th percentile queues (m)	V/C Ratios	Level of Service	95th percentile queues (m)
Queens Drive South	55%	C	50	90%	D	255
High Street East	75%	C	50	40%	D	30
Queens Drive North	78%	C	75	50%	C	75
High Street West	22%	C	10	94%	D	115
All vehicles	78%	C	75	94%	D	255

The following points are noted for the High Street/Queens Drive intersection

- In the morning peak, no significant issues are predicted with each approach predicted to operate with LOS C. The highest V/C ratio is predicted to be 78% on the Queens Drive north approach
- In the evening peak, several approaches are predicted to operate at LOS D. The highest predicted V/C ratio is 94% on the Queens Drive south approach.

Table 15: SIDRA intersection performance of Ewen Bridge/Queens Drive, with the Project

Approach	Morning Peak			Evening Peak		
	V/C Ratios	Level of Service	95th percentile queues (m)	V/C Ratios	Level of Service	95th percentile queues (m)
Woburn Road	54%	C	75	50%	C	80
Queens Drive	76%	C	80	85%	C	185
Ewen Bridge	74%	B	110	83%	B	180
All vehicles	76%	C	110	85%	C	185

No significant issues are predicted at the Ewen Bridge/Queens Drive intersection with LOS C or better being predicted for each of the approaches during the morning peak and evening peak periods. In the evening peak, the highest predicted V/C ratio is 85% for the right turning movements on the Ewen Bridge approach.

The NWSM indicates that the following intersections along Dudley Street will operate with LOS A in both peak periods

- Dudley Street/Rutherford Street/Margaret Street intersection
- Dudley Street/Andrews Avenue intersection.

5.3.3 Railway Avenue/Ewen Bridge Intersections

The performance of the Railway Avenue, Victoria Street and Ewen Bridge interchange, as assessed using SIDRA is summarised in Table 16. The detailed SIDRA outputs are provided in Appendix C.

Table 16: Intersection performance for Railway Avenue, Victoria Street and Ewen Bridge interchange with the Project

Approach	Morning Peak			Evening Peak		
	V/C Ratios	Level of Service	95th percentile queues (m)	V/C Ratios	Level of Service	95th percentile queues (m)
Victoria Street South (mid-block)	55%	A	40	70%	A	55
Marsden Street	72%	C	55	63%	C	70
Railway Avenue East Off-Ramp	12%	C	5	11%	D	5
North intersection	72%	B	55	63%	B	75
Victoria Street South	50%	B	50	90%	D	165
Railway Avenue East Off-Ramp	45%	B	55	79%	C	80
Victoria Street North (mid-block)	56%	A	30	28%	C	30
South intersection	56%	B	55	90%	C	165

The assessment predicts the performance of the Railway Avenue, Victoria Street and Ewen Bridge interchange to be operating at

- LOS B during the morning peak at both intersections. No significant issues are predicted

- LOS B (northern intersection) and LOS C (southern intersection) during the evening peak. The Victoria Street south approach at the south intersection is predicted to have a V/C ratio of 90%, for both the left and through traffic movements.

5.4 Sensitivity Tests

5.4.1 Additional Rail Investment

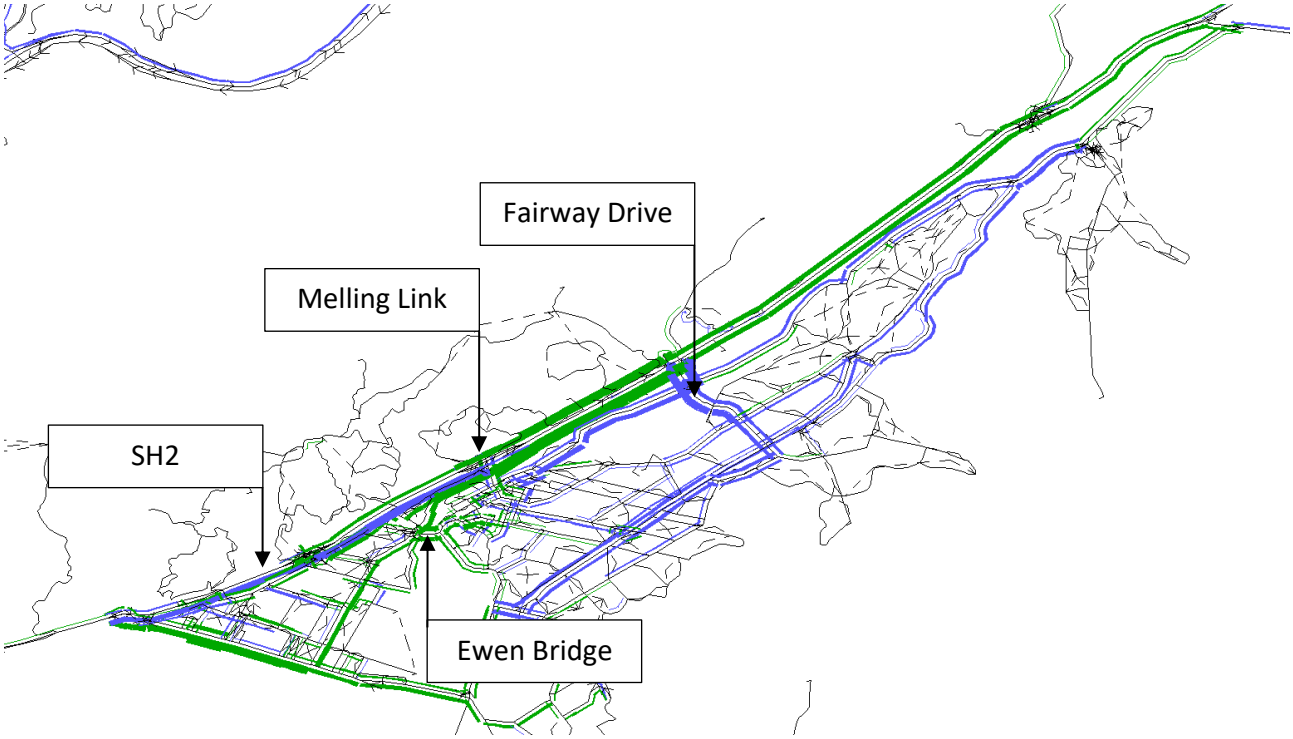
In Section 3, it is noted that the investment assumptions in WTSM assumes that Rail Investment Scenario 1 (RS1) has been implemented, but not Rail Investment Scenario 2 (RS2). Using WTSM, this sensitivity test has been completed to ascertain the effects of excluding RS2 from the traffic demands. This test indicates minimal changes in traffic demands about the Melling and Hutt City area.

5.4.2 Additional SH2 improvements

We have also completed a sensitivity test which include further upgrades at the SH2/ Grounsell Crescent and SH2/Major Drive/Kennedy Good Bridge (Fairway Drive) intersections. This sensitivity test allows free flow through movements on SH2 through these intersections, in addition to the Melling Interchange project in 2036. This test has been included to investigate the network response if signalised intersections along SH2 were to be removed between Melling Link and SH58.

Daily traffic volume comparisons between 2036 with the project and the additional SH2 improvements sensitivity test have been obtained from the NWSM. As described earlier, green bands represent the locations about the immediate network where daily traffic volumes are predicted to increase as a result of the sensitivity test, with blue bandwidths indicating where daily traffic volumes are predicted to decreases.

Figure 4: Daily Flow Comparisons between 2036 with the Project and Sensitivity test



This test predicts an increase in daily traffic volumes on SH2 in both directions north of the Melling interchange. Traffic volumes are predicted to increase slightly by some 700 PCUs per day on SH2 between SH58 and Fairview Drive and 1,500 PCUs per day between Fairview Drive and Melling interchange.

The daily traffic volumes south of Melling Link however, reduce due to the delays predicted at the SH2/Petone Interchange and SH2/Dowse Interchange. Traffic volumes are predicted to reduce about the local road network, north of Melling Interchange, with traffic volumes predicted to increase on the local road network south of Melling Interchange as a result of increased congestion on SH2, about Petone.

5.5 Conclusions on Operational Assessment

The assessment on the transport network has used the 2036 forecast year for predicting the effects associated with the Project. Using the NWSM, the following has been assessed, comparing the 2036 Do Minimum with the 2036 Project.

Traffic volumes are predicted to

- increase in both directions on SH2 between the Dowse interchange and Fairview Drive
- increase across the new Melling Bridge, with reductions on the Ewen Bridge
- decrease on the local network such as Railway Avenue/ Ewen Bridge, along Marsden Street and Harcourt Werry Drive due to the additional capacity provided at the Melling interchange
- divert from Melling Link to Queens Drive due to relocating the Melling Bridge landing, which will lead to a significant flow increase on Queens Drive between Rutherford Street and High Street

- decrease within Hutt City CBD due to the network accommodating active transport modes, such as at High Street north of Pretoria Street
- increase about the Hutt City CBD fringe, such as Kings Crescent and Knight Road, with traffic volumes on Margaret Street and Andrews Avenue increasing significantly, as a result of Dudley Street becoming a two-way street and the relocation of Riverbank car park demands.

Predicted Levels of Service (LOS) about the Project include

- LOS D and LOS C are predicted in the morning peak period for SH2 and Melling Bridge interchange, while LOS C is predicted for both intersections during the evening peak. Several turning movements are predicted to operate at LOS E, but all movements are predicted to operate within capacity, with the maximum volume to capacity ratio being 84% in the morning peak and 90% in the evening peak
- LOS B, C and D are predicted at the local road intersections within the Hutt City area, highlighting that the intersections are operating within capacity

Travel time and travel time reliability on SH2 is predicted to improve, due to the proposed grade separated interchange introduced with the Project. Travel times are predicted to

- Improve on SH2 mainline southbound by 4 minutes and 2 minutes during the morning and evening peak periods respectively
- Improve on SH2 mainline northbound by 1.5 minutes during the morning peak
- Improve for outbound traffic from Hutt City (both sides of the City) along SH2, by 2 to 3 minutes in the morning peak and 3 to 5 minutes in the evening peak.
- Improve slightly for inbound traffic travelling towards Hutt City by some 1 minute from SH 2 south and less than 1 minute from SH2 north, in both peak periods.

While the above outputs focus on traffic performance, the Project includes improvements to active mode (walking and cycling) users, with pedestrian protection being provided at the new Melling interchange and at all proposed signalised intersections within the Hutt City CBD. These improvements encourage the use of active modes and provides a safer environment for those who walk and cycle.

6 ASSESSMENT OF EFFECTS DURING CONSTRUCTION

6.1 Construction Tests

The following construction stages have been assessed, using the 2026 NWSM

- **Construction Scenario 1:** assumes the existing intersection layouts at the SH2/Melling Link intersection and the intersections within Lower Hutt, but with construction traffic management on SH2 near the SH2/Melling Link intersection
- **Construction Scenario 2:** as per Construction Scenario 1, with intersection layout changes at a few intersections within Lower Hutt (as described in Table 17). This test also assumes the closure of Rutherford Street between Melling Link and Margaret Street, and Queens Drive between High Street and Rutherford Street

- **Construction Scenario 3:** as per Construction Scenario 2, but with Rutherford Street re-opened and Queens Drive remaining closed between High Street and Rutherford Street
- **Construction Scenario 4:** as per Construction Scenario 3, but with the existing roundabout layouts at the Melling Link/Rutherford Street and Melling Link/High Street intersections.

To simulate the effects of the expected Construction Traffic Management Plan (CTMP), a 10% capacity reduction has been applied to the sections of SH2 1.5 kilometres north and south of the SH2/Melling Link interchange, with the maximum speed on these sections being reduced from 100 kph to 70 kph. These have been applied by adjusting the speed flow curves in the SATURN model and adjusting the saturation flows at intersections impacted.

Table 17: Intersection Assumptions for Construction Staging Assessment – 2026

Location/Intersections	Scenario 1	Scenario 2	Scenario 3	Scenario 4
SH2	CTMP	CTMP	CTMP	CTMP
Rutherford Street/Melling Link	Existing Layout	Signals (Rutherford Street west closed)	Signals	Existing Layout
High Street/Melling Link	Existing Layout	Signals	Signals	Existing Layout
High Street/Queens Drive	Existing Layout	Signals	Signals (Queens Drive north closed)	Signals (Queens Drive north closed)
Rutherford Street/Queens Drive	Existing Layout	Closed	Signals (Queens Drive closed – both arms)	Signals (Queens Drive closed – both arms)
Woburn Road/Queens Drive	Existing Layout	Signals	Signals	Signals
Railway Avenue/ Victoria Street	Existing Layout	Signals	Signals	Signals

6.2 Daily Traffic Volume Changes

Daily traffic volume comparisons between the 2026 Do Minimum and 2026 Construction scenarios have been extracted from the NWSM. As described earlier, green bands represent the locations about the immediate network where daily traffic volumes are predicted to increase as a result of the sensitivity test, with blue bandwidths indicating where daily traffic volumes are predicted to decreases.

Figure 5: Daily Flow Comparisons between 2026 Do Minimum and 2026 Construction Scenario 1

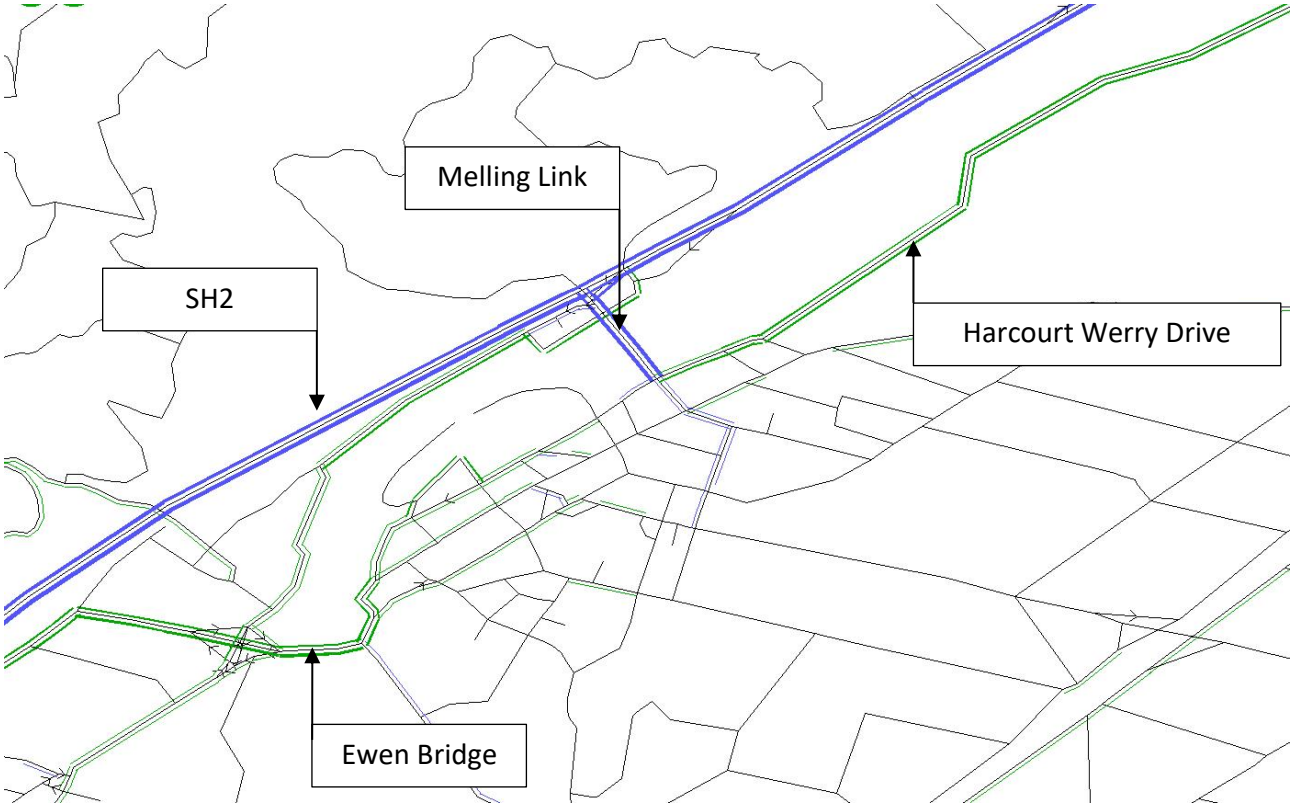


Figure 6: Daily Flow Comparisons between 2026 Do Minimum and 2026 Construction Scenario 2

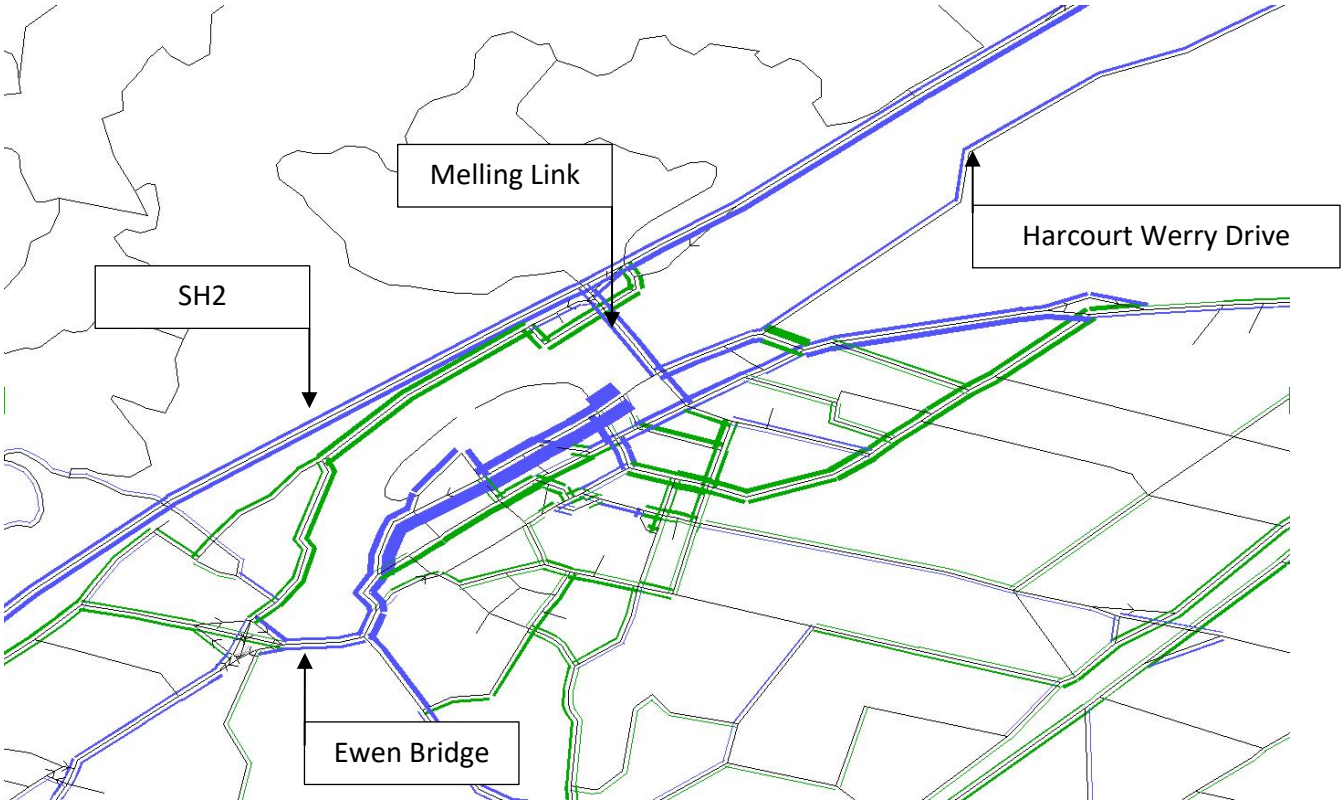


Figure 7: Daily Flow Comparisons between 2026 Do Minimum and 2026 Construction Scenario 3

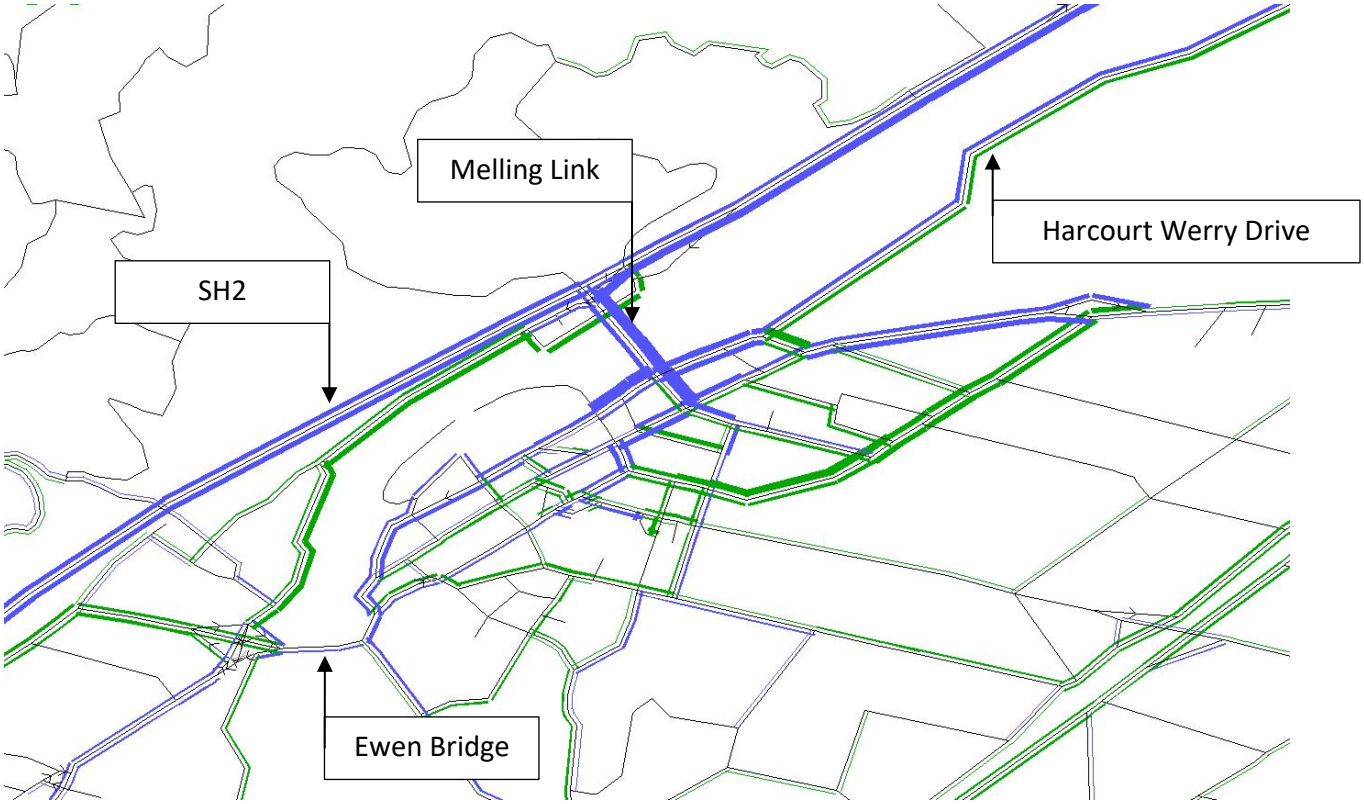
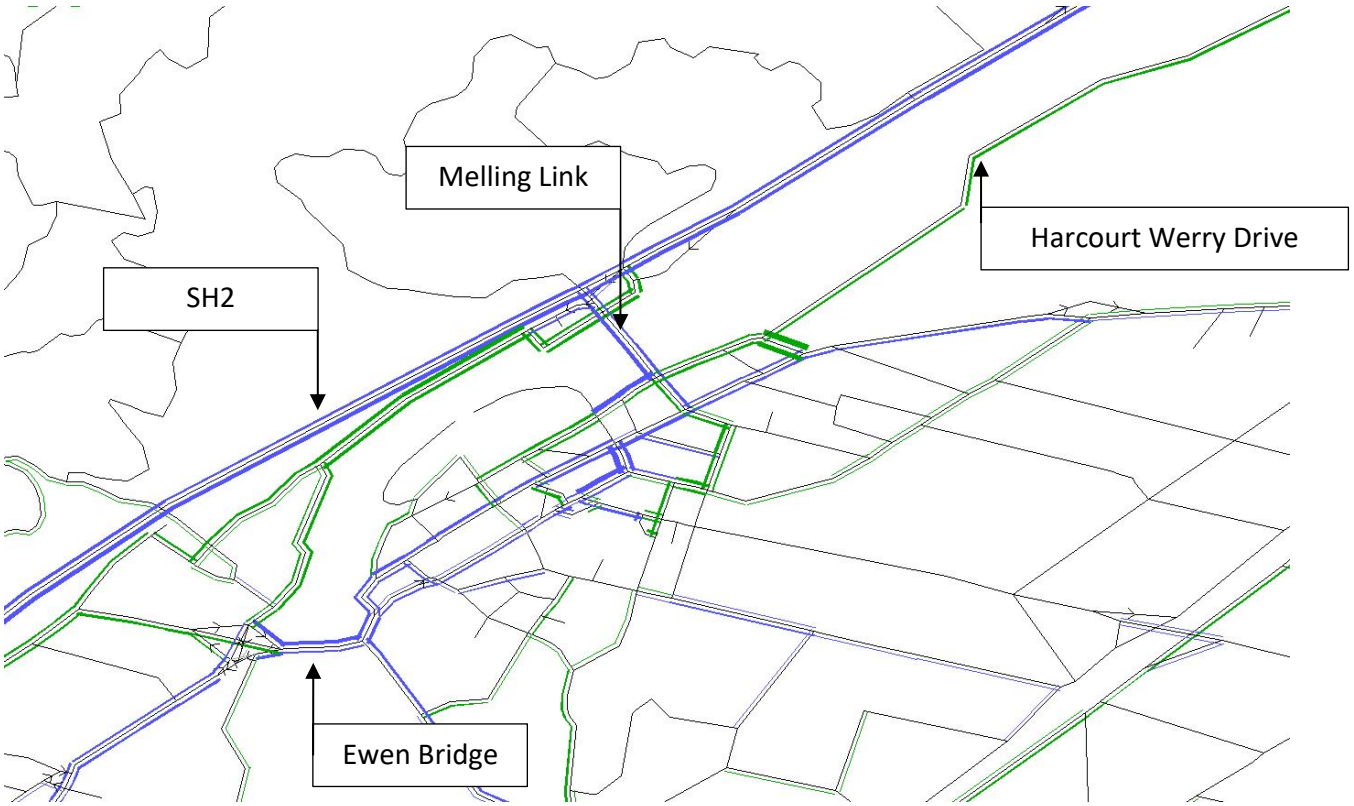


Figure 8: Daily Flow Comparisons between 2026 Do Minimum and 2026 Construction Scenario 4



We note the following:

- The proposed treatments in Construction Scenario 1 are predicted to result in modest traffic decreases, with approximately 3,000 vehicles/day in both directions re-routing from SH2 onto parallel routes (Railway Avenue and Connolly Street)
- For Construction Scenario 2, wider area re-routing is predicted and traffic on Rutherford Street (a reduction of some 8,100 vehicles/day in both directions) is predicted to use Pharazyn Street and Kings Crescent to 'bypass' Lower Hutt area. Daily traffic demands on High Street are also predicted to reduce, as the increases in daily traffic volumes between Melling Link and High Street are predicted to result in additional delays at the Melling Link/High Street intersection (which is assumed to be signalised)
- Similarly, traffic re-routing through Pharazyn Street and Kings Crescent is also predicted in Construction Scenario 3, where increases of 3,200 vehicles/day and 5,100 vehicles/day are predicted, respectively. We note that traffic demands on Rutherford Street and High Street are predicted to reduce, compared to those in the Do Minimum models
- In addition to the above, the following intersections have been identified with high delays, or high volume/capacity ratios, due to the proposed treatments in Construction Scenarios 2 and 3:
    - Rutherford Street/Melling Link intersection. Increased delays and high V/C ratios are predicted, particularly in Construction Scenario 3. The intersection operates as a T-intersection in Construction Scenario 2, which is predicted to result in a slightly more efficient operation compared to a four-arm, cross-road layout proposed in Scenario 3
    - High Street/Melling Link intersection. Delays are predicted to increase on Melling Link and High Street in both Construction Scenarios 2 and 3, due to signalisation and traffic re-routing
    - Railway Avenue/Woburn Road intersection. Delays are predicted to increase on Queens Drive approach in both scenarios
    - Victoria Street/Railway Avenue/Marsden Street intersection. Increased delays are predicted on Marsden Street approach in both Construction Scenarios 2 and 3, due to increased demands on Marsden Street
- It is predicted that the signalisation of Melling Link/Rutherford Street and Melling Link/High Street intersections will lead to significant delays during construction. We note that Construction Scenarios 2 and 3 assume that Melling Link will be changed to 1 lane per direction between Rutherford Street and High Street, which makes it difficult to apply alternative lane arrangements, or to optimise the signal phasing at the intersections. As such, we have included Construction Scenario 4, which assumes that the existing roundabout layouts are retained at the above intersections. The delays predicted for both intersections, when tested as roundabouts are lower than those predicted in Construction Scenario 2 and 3. It is also observed in Figure 8 that Construction Scenario 4 will result in less traffic diversion from Lower Hutt, compared to Scenario 2 and 3.

Based on the above, we recommend that the existing roundabout layouts at the Melling Link/Rutherford Street and Melling Link/High Street intersections be maintained during the construction period, until the new Melling Link connection to Queens Drive is completed. This requirement would be included as part of the Principal Requirements for the Project.

6.3 Travel Time Changes

Table 18 sets out the total travel time changes due to each of the construction scenarios. The absolute travel time totals are not very meaningful, as these depend to a significant extent on the size of the traffic model. Therefore the key metric relates to the differences (i.e. increases) in total times, relative to the 2026 Do Minimum scenario.

Table 18: Predicted total travel time of 2026 Do Minimum and Construction Scenarios (vehicle hour per hour)

	DM	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Morning Peak	13,890	14,050 (+160)	14,160 (+270)	14,150 (+260)	14,020 (+130)
Evening Peak	15,530	15,590 (+60)	15,740 (+210)	15,820 (+290)	15,690 (+160)

The table indicates:

- Construction scenario 1 will increase total travel times by some 160 and 60 vehicle hours per hour in the morning and evening peak respectively
- Construction scenarios 2 and 3 are predicted to lead to greater increases in total travel times, particularly in the evening peak
- Construction Scenario 4 is predicated with similar travel time increases as Construction Scenario 1 in the morning, but the total travel time increases in the evening peak are predicted to be greater than Scenario 1 and less than Scenarios 2 and 3.

The table above indicates a measure of the total effects of the various scenarios. **Error! Reference s ource not found.** below summarises the predicted travel times along particular routes close to the project, being

- SH2, south of the SH2 Dowse Drive interchange, to the north of the SH2 Grounsell Crescent intersection
- SH2, south of SH2 Dowse Drive interchange to the Melling Link/Rutherford Street intersection (Lower Hutt), and
- SH2, north of SH2 Grounsell Crescent intersection to the Melling Link/Rutherford Street intersection (Lower Hutt).

To capture the full effects of the proposed CTMP, the travel time routes to/from SH2 south have been extended from the north of SH2/Dowse Interchange (as presented in Section 5.2) to south of the Dowse interchange. To help highlight the predicted change in travel times between the Do Minimum and the Project, the following colour codes have been applied.

Decreases under 1 minute	Increases under 1 minute
Decreases between 1 and 3 minutes	Increases between 1 and 3 minutes
Decreases over 3 minutes	Increases over 3 minutes

Table 19: Predicted travel time of 2026 Do Minimum and Construction Scenarios

Route	DM		Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
SH2 South to North	04:25	04:35	05:15	05:40	05:15	05:45	05:15	05:40	05:15	05:45
SH2 North to South	09:40	05:05	14:30	06:00	15:30	06:05	14:30	06:20	14:50	06:15
SH2 South to Lower Hutt	06:15	05:10	09:15	05:45	07:40	06:15	09:15	07:20	07:10	06:10
Lower Hutt to SH2 South	07:55	04:35	12:15	04:50	13:00	05:20	10:20	04:55	12:35	05:45
Lower Hutt to SH2 North	04:15	06:40	06:15	07:05	06:35	07:15	05:15	07:10	06:25	07:40
SH2 North to Lower Hutt	03:25	02:45	04:05	03:10	06:05	03:45	07:55	05:45	05:15	03:10

The predicted travel times during construction show that travel times on SH2 are predicted to increase by 5 to 6 minutes southbound in the morning peak, with all four test scenarios, with northbound travel times predicted to increase by a minute during the evening peak. The forecast times between Lower Hutt and SH2 are overall fairly similar, meaning that the additional times indicated by the times in Table 18 are predicted to be at intersections within the Hutt Centre itself.

6.4 Construction Test Conclusion

The assessment indicates that the transport effects predicted during the construction of the Project are expected to be

- Reduction in traffic volumes on SH2, as motorists avoid predicted increases in travel times along SH2 caused by the reduction in capacity through the CTMP
- Increase in traffic about the adjacent local road network
- Increases in travel time during the busy commuter periods (morning southbound and evening northbound). Travel times on SH2 are predicted to increase by 5 to 6 minutes southbound in the morning peak, with all temporary scenarios, with northbound travel times predicted to increase by around a minute during the evening peak
- The overall effects of construction scenarios 2 and 3 are predicted to be greater, due to the temporary works anticipated within the Hutt Centre. These effects may be mitigated by retaining the existing roundabout layouts at the Melling Link/Rutherford Street and Melling Link/High Street intersections during the construction period along SH2, until the new Melling Link connection to Queens Drive is completed.

APPENDIX A Delay plots - Do Minimum

Figure A 1: Delay plot - 2018 Base Year – AM Peak

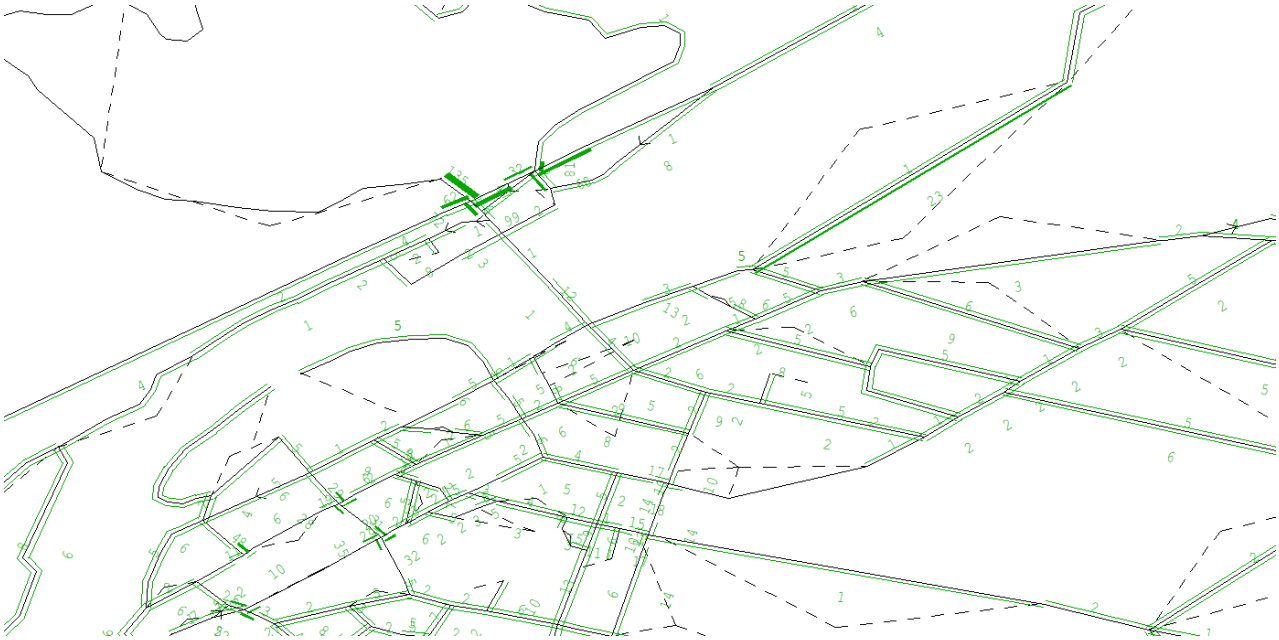


Figure A 2: Delay plot - 2026 Do Minimum – AM Peak

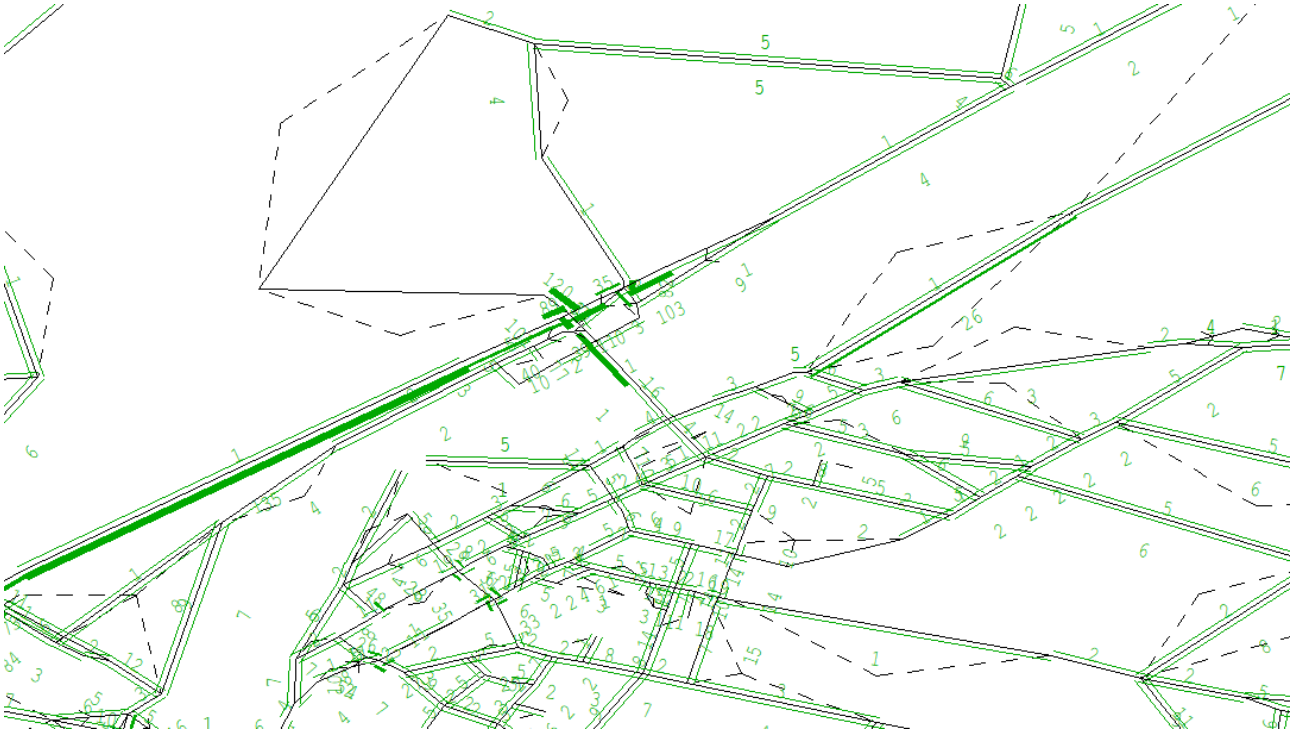


Figure A 3: Delay plot - 2036 Do Minimum – AM Peak

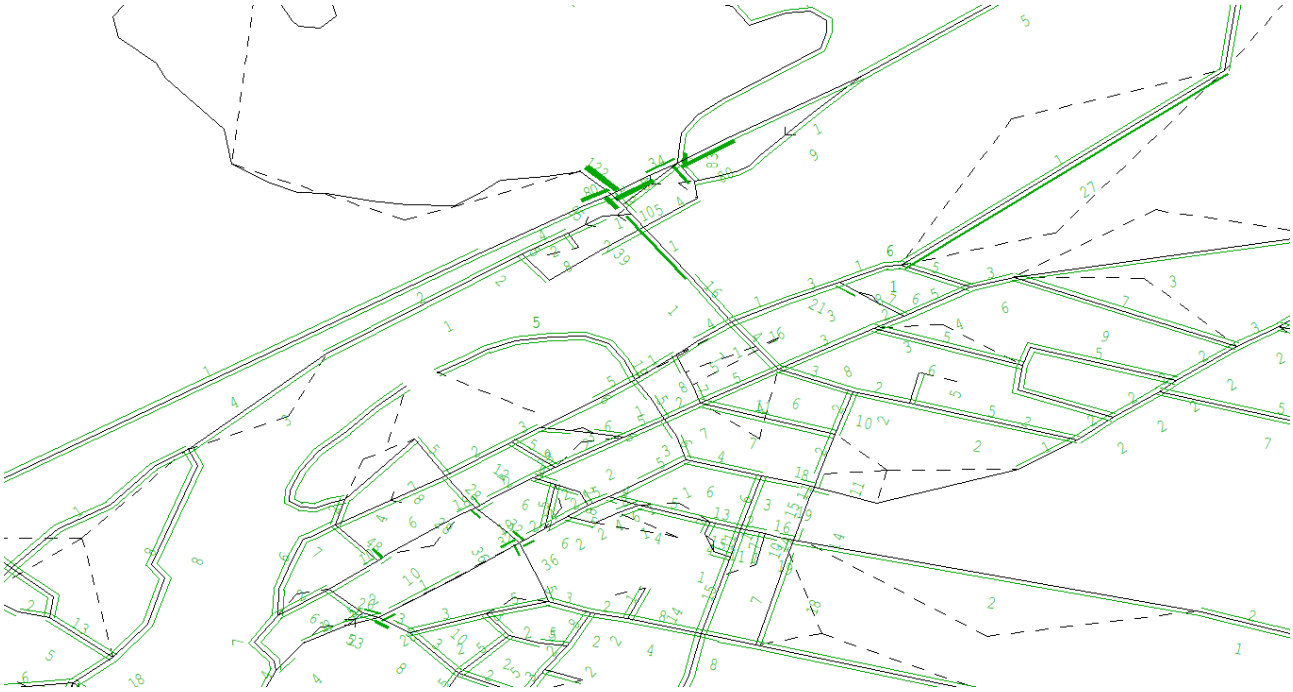


Figure A 4: Delay plot - 2018 Base Year – PM Peak

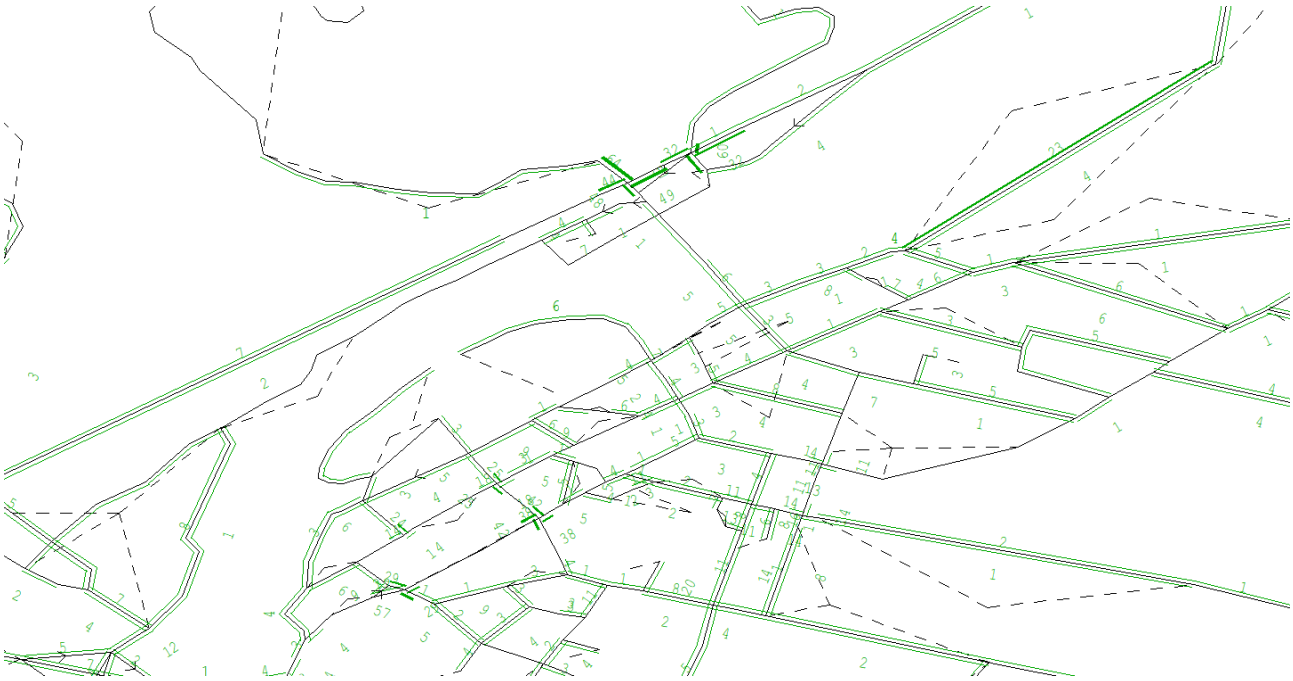


Figure A 5: Delay plot - 2026 Do Minimum – PM Peak

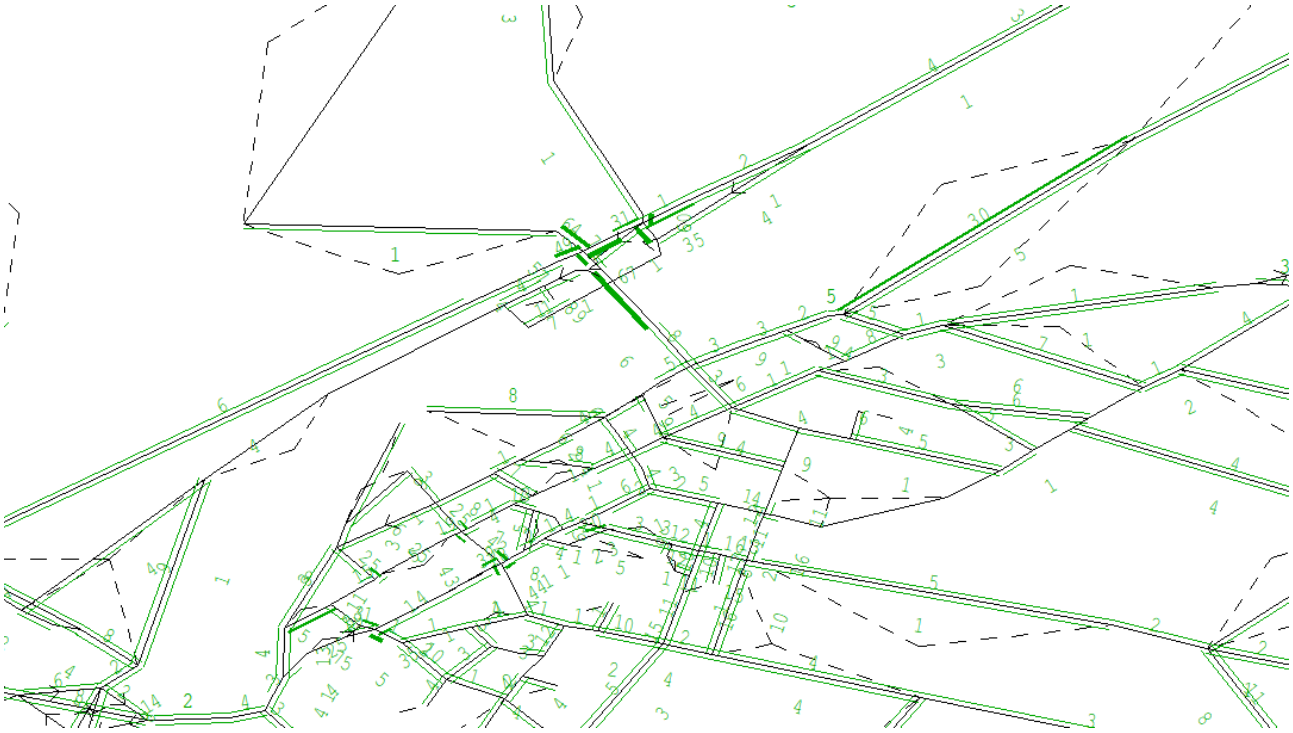
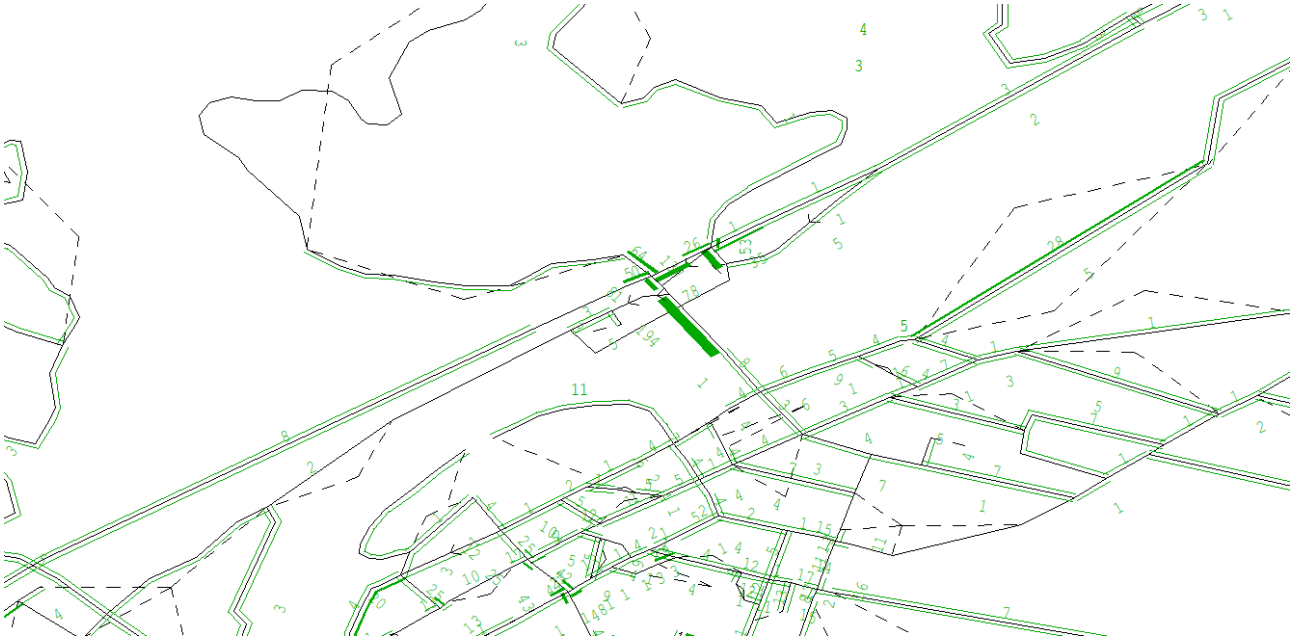


Figure A 6: Delay plot - 2036 Do Minimum – PM Peak



APPENDIX B NWSM Predicted Modelled Volumes

Road	Section	2018 DM	2036 DM	2036 DS
		AADT (vpd)	AADT (vpd)	AADT (vpd)
Melling Link		26,250	24,450	31,500
Tirohanga Road		1,650	1,850	1,650
Pomare Road	both directions	650	700	700
Wairere Road	both directions	750	800	800
Harbour View Road	both directions	2,750	2,850	1,700
Normandale Road	Miromiro Rd - Bridge St	4,850	5,250	4,550
State Highway 2 (southbound)	North of Melling Link	22,700	25,750	28,200
	Melling Link - Normandale Road	23,150	22,900	28,800
State Highway 2 (northbound)	North of Melling Link	23,200	23,350	25,850
	Melling Link - Normandale Road	25,850	27,500	30,900
Connolly Street	Harcourt Werry Drive - Mills Road	15,050	16,200	12,850
Rutherford Street	Connolly St - Pretoria Street	17,750	20,900	16,100
	Pretoria Street - Queens Drive	12,800	17,650	14,650
	Queens Drive - Margaret Street	8,750	11,650	9,850
High Street	North of Pretoria Street	7,050	5,500	4,500
	Pretoria Street - Raroa Road	5,150	3,350	1,800
	Raroa Road - Queens Drive	6,050	4,650	5,500
	Queens Drive - Waterloo Road	5,450	6,250	5,300
	Waterloo Road - Margaret Street	5,500	4,150	1,850
	Margaret Street - Andrews Avenue	4,650	2,250	1,850
	Andrews Avenue - Laings Road	5,850	3,600	7,250
	Laings Road - Daly Street	5,800	2,700	5,350
	Daly Street - Queens Drive	15,500	19,000	8,100
Pretoria Street	High Street - Cornwall Street	8,750	9,550	4,000
	Cornwall Street - King Cres	2,000	2,400	1,450
	High Street - Melling Link	11,400	12,600	1,850
Cornwall Street	both directions	7,300	7,900	4,700
Kings Crescent	Pretoria St - Cornwall St	2,850	4,800	5,850
	Cornwall St - Bloomsfield Terrace	2,200	4,650	6,650
	Bloomsfield Terrace - Queens Drive	1,500	3,700	5,750
Waterloo Road	Cornwall St - Bloomsfield Terrace	6,050	10,150	10,350
	Bloomsfield Terrace - Queens Drive	5,200	8,000	9,450
	Queens Drive - High St	5,700	7,700	8,800
Bloomsfield Terrace	both directions	2,700	5,350	6,100
Queens Drive	Rutherford St - High St	6,000	8,200	14,050
	High Street - Kings Cres	5,650	7,200	9,500
	Kings Cres - Waterloo Rd	5,100	6,350	8,500
	Waterloo Rd - Margaret St	2,550	4,950	6,150
	Margaret St - Laings Rd	2,650	3,850	2,750
	Laings Road - High Street	11,200	15,250	14,450
	High Street - Ewen Bridge	26,500	34,900	2,250
Daly Street	Rutherford Street - Andrews Avenue	3,900	6,050	n/a
	Andrews Avenue - High Street	9,200	14,400	n/a
Andrews Avenue		150	550	4,300
Dudley Street	Margaret St - Andrews Ave (westbound)	5,000	8,250	3,000
	Andrew Ave - Margaret St (eastbound)	n/a	n/a	1,300
Margaret Street	Dudley St - High St	350	1,650	2,600
	High St - Queens Dr	100	200	1,500
Bunny Drive		1,000	1,650	4,450
Knights Road	Bloomfield Terrace - Cornwall St	12,450	13,750	13,700
	45 Knights Road - Bloomfield Terrace	11,050	13,800	15,000
	Myrtle St - 45 Knights Road	9,950	12,550	13,800
	Margaret St - Myrtle St	8,750	11,550	13,250
	Stevens Grove - Margaret St	7,100	8,800	8,850
	Laings Rd - Stevens Grove	8,800	10,450	10,100
Laings Road	High Street - Queens Drive	1,000	2,150	850
	Queens Drive - Myrtle Street	1,700	1,250	1,900
Woburn Road	Queens Dr - Myrtle St	18,800	19,350	17,550
	Myrtle St - Wai-Iti Cres	18,800	19,350	17,550
Ewen Bridge	both directions	35,050	44,950	34,000
Tama Street	Victoria St - Titoki St	100	300	100
	Titoki St - Mudie St	100	300	100
Victoria Street	Buckley St - Alice St	13,250	16,450	12,100
	Alice St - Titoki St	13,200	17,050	12,500
	Titoki St - Te Mome Rd	13,250	16,500	11,900
	North of Te Mome Rd	14,750	18,000	13,150
Te Mome Road		250	150	300
Railway Avenue	Ewen Bridge - Aglionby St	17,450	22,650	17,950
	Aglionby St - Herbert St	18,000	23,400	18,550
	Herbert St - Hutt Rd	21,200	25,750	21,100
Parliament Street		2,750	2,000	2,350
Bridge Street		1,950	1,450	2,300
Marsden Street	Victoria St - Bridge St	8,050	9,600	6,400
	Bridge St - Pharazyn St	4,350	5,000	3,500

Pharazyn Street	Bridge Street - Marsden Street	2,850	2,350	3,200
	Marsden Street - Block Road	7,550	6,950	6,350
	Block Rd - Melling Link	7,550	6,950	7,050
State Highway 2 On-ramp SB	(Between on and off ramp)	n/a	n/a	8,000
State Highway 2 Off-ramp SB	(Between on and off ramp)	n/a	n/a	7,750
State Highway 2 On-ramp NB	(Between on and off ramp)	n/a	n/a	6,300
State Highway 2 Off-ramp NB	(Between on and off ramp)	n/a	n/a	11,350
State Highway 2 Interchange	(Between on and off ramp)	n/a	n/a	20,600
Block Road		7,550	6,950	n/a

APPENDIX C SIDRA Intersection Outputs

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [CCG-120s]

Network: N101 [AM_CCG120s (Network Folder: Melling Interchange)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (CCG User-Given Cycle Time)

Vehicle Movement Performance (CCG)

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Site: 101 [SH2 North AM peak - Import - Copy]														
South: Melling Link														
2	T1	76	0.0	76	0.0	0.079	5.9	LOS A	0.8	5.8	0.20	0.16	0.20	51.2
3	R2	225	0.0	225	0.0	0.123	22.8	LOS C	4.2	29.1	0.61	0.71	0.61	35.0
Approach		301	0.0	301	0.0	0.123	18.5	LOS B	4.2	29.1	0.50	0.57	0.50	38.1
North: Harbour View Road														
7	L2	6	0.0	6	0.0	0.675	65.7	LOS E	7.2	50.5	1.00	0.83	1.08	29.7
8	T1	235	0.0	235	0.0	0.675	60.2	LOS E	7.2	50.6	1.00	0.83	1.08	20.3
Approach		241	0.0	241	0.0	0.675	60.3	LOS E	7.2	50.6	1.00	0.83	1.08	20.6
West: SH2 Off Ramp														
10	L2	46	0.0	46	0.0	0.093	40.9	LOS D	2.0	14.1	0.79	0.72	0.79	35.3
12	R2	882	0.0	882	0.0	*0.824	53.1	LOS D	26.3	183.9	0.99	0.92	1.10	22.1
Approach		928	0.0	928	0.0	0.824	52.5	LOS D	26.3	183.9	0.98	0.91	1.08	22.9
All Vehicles		1470	0.0	1470	0.0	0.824	46.8	LOS D	26.3	183.9	0.89	0.83	0.96	24.6
Site: 101 [SH2 South AM peak - Import - Copy]														
South: Melling Link														
1b	L3	169	0.0	169	0.0	0.401	21.2	LOS C	8.0	55.9	0.74	0.78	0.74	44.1
1	L2	410	0.0	410	0.0	0.401	21.2	LOS C	8.3	58.3	0.76	0.78	0.76	43.5
2	T1	198	0.0	198	0.0	0.115	12.0	LOS B	2.3	16.3	0.62	0.49	0.62	43.3
Approach		777	0.0	777	0.0	0.401	18.9	LOS B	8.3	58.3	0.72	0.71	0.72	43.6
East: SH2 Off-Ramp														
4	L2	500	0.0	500	0.0	*0.808	37.6	LOS D	21.4	149.7	0.97	0.93	1.04	36.5
4a	L1	275	0.0	275	0.0	*0.785	58.5	LOS E	16.4	114.5	1.00	0.91	1.11	30.8
6	R2	47	0.0	47	0.0	0.138	50.0	LOS D	2.3	16.2	0.87	0.74	0.87	22.9
Approach		822	0.0	822	0.0	0.808	45.3	LOS D	21.4	149.7	0.98	0.91	1.05	33.7
North: Melling Link														
8	T1	981	0.0	981	0.0	0.592	5.3	LOS A	6.5	45.8	0.25	0.22	0.25	52.1
9a	R1	42	0.0	42	0.0	*0.792	65.8	LOS E	8.4	58.6	1.00	0.88	1.17	20.6
9	R2	94	0.0	94	0.0	0.792	67.1	LOS E	8.4	58.6	1.00	0.88	1.17	20.2
Approach		1117	0.0	1117	0.0	0.792	12.8	LOS B	8.4	58.6	0.34	0.30	0.36	43.7
SouthWest: Pharazyn Street														
30b	L3	30	0.0	30	0.0	0.028	10.4	LOS B	0.4	2.9	0.29	0.64	0.29	51.3
30a	L1	56	0.0	56	0.0	0.391	64.1	LOS E	3.3	22.9	0.99	0.75	0.99	19.5
32b	R3	102	0.0	102	0.0	*0.837	74.9	LOS E	6.7	46.7	1.00	0.94	1.39	26.8
Approach		188	0.0	188	0.0	0.837	61.4	LOS E	6.7	46.7	0.88	0.84	1.10	27.5
All Vehicles		2904	0.0	2904	0.0	0.837	26.7	LOS C	21.4	149.7	0.66	0.62	0.70	38.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [Ped	Dist]	Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	sec		ped	m			sec	m	m/sec
Site: 101 [SH2 North AM peak - Import - Copy]											
East: SH2 On Ramp											
P2	Full	50	54.3	LOS E	0.2	0.2	0.95	0.95	214.7	208.6	0.97
North: Harbour View Road											
P3	Full	50	54.3	LOS E	0.2	0.2	0.95	0.95	218.8	213.9	0.98
West: SH2 Off Ramp											
P4	Full	50	54.3	LOS E	0.2	0.2	0.95	0.95	217.3	211.9	0.98
All Pedestrians		150	54.3	LOS E	0.2	0.2	0.95	0.95	216.9	211.5	0.97
Site: 101 [SH2 South AM peak - Import - Copy]											
East: SH2 Off-Ramp											
P2	Full	50	28.8	LOS C	0.1	0.1	0.90	0.90	191.8	211.9	1.10
West: SH2 On-Ramp											
P4	Full	50	28.0	LOS C	0.1	0.1	0.90	0.90	188.5	208.6	1.11
SouthWest: Pharazyn Street											
P8	Full	50	28.0	LOS C	0.1	0.1	0.90	0.90	192.6	213.9	1.11
All Pedestrians		150	28.3	LOS C	0.1	0.1	0.90	0.90	190.9	211.5	1.11

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [CCG-120s]

Network: N101 [PM_CCG120s (Network Folder: Melling Interchange)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (CCG User-Given Cycle Time)

Vehicle Movement Performance (CCG)

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Site: 101 [SH2 North PM peak - Import]														
South: Melling Link														
2	T1	228	0.0	228	0.0	0.251	9.2	LOS A	3.9	27.2	0.31	0.27	0.31	47.3
3	R2	921	0.0	921	0.0	0.531	30.8	LOS C	14.0	97.9	0.84	0.83	0.84	30.9
Approach		1149	0.0	1149	0.0	0.531	26.5	LOS C	14.0	97.9	0.74	0.72	0.74	33.2
North: Harbour View Road														
7	L2	6	0.0	6	0.0	0.735	72.3	LOS E	4.5	31.6	1.00	0.84	1.22	28.1
8	T1	137	0.0	137	0.0	*0.735	66.7	LOS E	4.5	31.8	1.00	0.84	1.22	18.9
Approach		143	0.0	143	0.0	0.735	67.0	LOS E	4.5	31.8	1.00	0.84	1.22	19.4
West: SH2 Off Ramp														
10	L2	65	0.0	65	0.0	0.105	34.9	LOS C	2.6	18.2	0.72	0.73	0.72	37.5
12	R2	860	0.0	860	0.0	0.651	40.0	LOS D	21.2	148.3	0.89	0.85	0.89	26.1
Approach		925	0.0	925	0.0	0.651	39.7	LOS D	21.2	148.3	0.88	0.84	0.88	27.2
All Vehicles		2217	0.0	2217	0.0	0.735	34.6	LOS C	21.2	148.3	0.81	0.78	0.83	29.3
Site: 101 [SH2 South PM peak - Import]														
South: Melling Link														
1b	L3	136	0.0	136	0.0	0.861	33.4	LOS C	21.7	151.7	0.82	0.89	0.97	38.6
1	L2	913	0.0	913	0.0	*0.861	32.6	LOS C	21.7	151.7	0.82	0.89	0.97	38.4
2	T1	878	0.0	878	0.0	*0.901	44.7	LOS D	26.0	181.9	0.98	1.06	1.29	24.6
Approach		1927	0.0	1927	0.0	0.901	38.2	LOS D	26.0	181.9	0.89	0.97	1.12	32.9
East: SH2 Off-Ramp														
4	L2	290	0.0	290	0.0	0.551	30.7	LOS C	11.1	77.6	0.90	0.81	0.90	39.2
4a	L1	225	0.0	225	0.0	*0.831	65.1	LOS E	14.1	98.8	1.00	0.96	1.23	29.2
6	R2	86	0.0	86	0.0	0.654	63.0	LOS E	5.2	36.4	0.99	0.84	1.10	19.7
Approach		601	0.0	601	0.0	0.831	48.2	LOS D	14.1	98.8	0.95	0.87	1.05	32.2
North: Melling Link														
8	T1	932	0.0	932	0.0	0.531	6.3	LOS A	7.0	49.1	0.27	0.24	0.27	50.7
9a	R1	27	0.0	27	0.0	0.702	70.9	LOS E	4.2	29.2	1.00	0.79	1.09	19.6
9	R2	39	0.0	39	0.0	0.702	72.2	LOS E	4.2	29.2	1.00	0.79	1.09	19.3
Approach		998	0.0	998	0.0	0.702	10.7	LOS B	7.0	49.1	0.32	0.28	0.33	45.8
SouthWest: Pharazyn Street														
30b	L3	29	0.0	29	0.0	0.031	12.4	LOS B	0.5	3.5	0.36	0.65	0.36	49.9
30a	L1	188	0.0	188	0.0	0.823	69.0	LOS E	9.6	67.2	1.00	0.94	1.29	18.5
32b	R3	69	0.0	69	0.0	*0.823	73.5	LOS E	6.9	48.2	1.00	0.95	1.36	27.1
Approach		286	0.0	286	0.0	0.823	64.4	LOS E	9.6	67.2	0.93	0.91	1.22	23.4
All Vehicles		3812	0.0	3812	0.0	0.901	34.5	LOS C	26.0	181.9	0.75	0.77	0.91	33.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
Site: 101 [SH2 North PM peak - Import]											
East: SH2 On Ramp											
P2	Full	50	54.3	LOS E	0.2	0.2	0.95	0.95	214.7	208.6	0.97
North: Harbour View Road											
P3	Full	50	54.3	LOS E	0.2	0.2	0.95	0.95	218.8	213.9	0.98
West: SH2 Off Ramp											
P4	Full	50	54.3	LOS E	0.2	0.2	0.95	0.95	217.3	211.9	0.98
All Pedestrians		150	54.3	LOS E	0.2	0.2	0.95	0.95	216.9	211.5	0.97
Site: 101 [SH2 South PM peak - Import]											
East: SH2 Off-Ramp											
P2	Full	50	28.0	LOS C	0.1	0.1	0.90	0.90	191.0	211.9	1.11
West: SH2 On-Ramp											
P4	Full	50	30.4	LOS D	0.1	0.1	0.90	0.90	190.9	208.6	1.09
SouthWest: Pharazyn Street											
P8	Full	50	30.4	LOS D	0.1	0.1	0.90	0.90	195.0	213.9	1.10
All Pedestrians		150	29.6	LOS C	0.1	0.1	0.90	0.90	192.3	211.5	1.10

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 103 [Rutherford Street / Old Melling Link Int - AM peak (Site Folder: North Hutt CBD Intersections)]

2036_AM_Mitigated
Site Category: Proposed Design 1
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 66 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Meeling Link NB														
1	L2	6	0.0	6	0.0	0.013	24.2	LOS C	0.2	1.1	0.77	0.64	0.77	22.3
3	R2	27	0.0	28	0.0	*0.144	35.1	LOS D	0.9	6.2	0.94	0.71	0.94	20.6
Approach		33	0.0	35	0.0	0.144	33.1	LOS C	0.9	6.2	0.91	0.69	0.91	20.9
East: Rutherford St WB														
4	L2	257	0.0	271	0.0	0.397	12.9	LOS B	7.5	52.3	0.59	0.66	0.59	33.9
5	T1	533	0.0	561	0.0	0.397	9.5	LOS A	7.9	55.3	0.62	0.58	0.62	37.2
Approach		790	0.0	832	0.0	0.397	10.6	LOS B	7.9	55.3	0.61	0.61	0.61	36.2
West: Rutherford St EB														
11	T1	629	0.0	662	0.0	*0.647	11.9	LOS B	15.2	106.7	0.76	0.68	0.76	35.7
12	R2	9	0.0	9	0.0	*0.056	35.7	LOS D	0.3	2.1	0.94	0.66	0.94	17.8
Approach		638	0.0	672	0.0	0.647	12.3	LOS B	15.2	106.7	0.77	0.68	0.77	35.4
All Vehicles		1461	0.0	1538	0.0	0.647	11.8	LOS B	15.2	106.7	0.69	0.64	0.69	35.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Meeling Link NB												
P1	Full	50	53	27.3	LOS C	0.1	0.1	0.91	0.91	206.7	215.2	1.04
East: Rutherford St WB												
P2	Full	50	53	27.3	LOS C	0.1	0.1	0.91	0.91	203.9	211.9	1.04
West: Rutherford St EB												
P4	Full	50	53	27.3	LOS C	0.1	0.1	0.91	0.91	206.7	215.2	1.04
All Pedestrians		150	158	27.3	LOS C	0.1	0.1	0.91	0.91	205.7	214.1	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 103 [Rutherford Street / Old Melling Link Int - PM peak (Site Folder: North Hutt CBD Intersections)]

2036_PM_Option 1
Site Category: Proposed Design 1
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 92 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Meeling Link NB														
1	L2	43	0.0	45	0.0	0.102	34.1	LOS C	1.6	11.1	0.81	0.71	0.81	18.3
3	R2	1	0.0	1	0.0	0.005	44.2	LOS D	0.0	0.3	0.91	0.59	0.91	18.0
Approach		44	0.0	46	0.0	0.102	34.3	LOS C	1.6	11.1	0.82	0.71	0.82	18.3
East: Rutherford St WB														
4	L2	17	0.0	18	0.0	0.241	12.9	LOS B	5.6	39.5	0.48	0.43	0.48	36.5
5	T1	526	0.0	554	0.0	0.241	8.5	LOS A	5.8	40.6	0.48	0.42	0.48	38.7
Approach		543	0.0	572	0.0	0.241	8.7	LOS A	5.8	40.6	0.48	0.42	0.48	38.7
West: Rutherford St EB														
11	T1	900	0.0	947	0.0	* 0.799	15.0	LOS B	32.5	227.2	0.83	0.77	0.83	33.3
12	R2	1	0.0	1	0.0	0.007	46.5	LOS D	0.0	0.3	0.93	0.59	0.93	14.9
Approach		901	0.0	948	0.0	0.799	15.1	LOS B	32.5	227.2	0.83	0.77	0.83	33.2
All Vehicles		1488	0.0	1566	0.0	0.799	13.3	LOS B	32.5	227.2	0.70	0.64	0.70	34.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Meeling Link NB												
P1	Full	50	53	40.3	LOS E	0.1	0.1	0.94	0.94	219.6	215.2	0.98
East: Rutherford St WB												
P2	Full	50	53	40.3	LOS E	0.1	0.1	0.94	0.94	216.9	211.9	0.98
West: Rutherford St EB												
P4	Full	50	53	40.3	LOS E	0.1	0.1	0.94	0.94	219.6	215.2	0.98
All Pedestrians		150	158	40.3	LOS E	0.1	0.1	0.94	0.94	218.7	214.1	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 104 [High St / Pretoria St Int AM peak (Site Folder: North Hutt CBD Intersections)]

Option_1_2036_AM Peak Mitigated
Site Category: Proposed Design 1
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Pretoria St NB														
1	L2	2	0.0	2	0.0	0.070	23.4	LOS C	0.7	5.0	0.79	0.59	0.79	35.2
2	T1	28	0.0	29	0.0	0.070	18.8	LOS B	0.7	5.0	0.79	0.59	0.79	34.4
3	R2	16	0.0	17	0.0	* 0.078	31.3	LOS C	0.5	3.2	0.92	0.68	0.92	32.0
Approach		46	0.0	48	0.0	0.078	23.4	LOS C	0.7	5.0	0.84	0.62	0.84	33.4
East: High St WB														
4	L2	26	0.0	27	0.0	0.603	31.4	LOS C	5.1	35.8	0.97	0.81	1.02	33.5
5	T1	141	0.0	148	0.0	* 0.603	26.8	LOS C	5.1	35.8	0.97	0.81	1.02	28.8
6	R2	5	0.0	5	0.0	* 0.028	32.0	LOS C	0.1	1.0	0.92	0.64	0.92	24.8
Approach		172	0.0	181	0.0	0.603	27.7	LOS C	5.1	35.8	0.97	0.81	1.02	29.6
North: Melling Link SB														
7	L2	1	0.0	1	0.0	0.597	26.8	LOS C	7.3	51.1	0.93	0.78	0.93	29.3
8	T1	257	0.0	271	0.0	* 0.597	22.2	LOS C	7.3	51.1	0.93	0.78	0.93	32.7
9	R2	9	0.0	9	0.0	0.044	31.0	LOS C	0.3	1.8	0.91	0.66	0.91	20.3
Approach		267	0.0	281	0.0	0.597	22.5	LOS C	7.3	51.1	0.93	0.78	0.93	32.4
West: High St EB														
10	L2	6	0.0	6	0.0	0.293	29.4	LOS C	2.3	16.1	0.92	0.71	0.92	23.0
11	T1	75	0.0	79	0.0	0.293	24.8	LOS C	2.3	16.1	0.92	0.71	0.92	29.9
12	R2	1	0.0	1	0.0	0.006	31.5	LOS C	0.0	0.2	0.92	0.58	0.92	29.6
Approach		82	0.0	86	0.0	0.293	25.3	LOS C	2.3	16.1	0.92	0.71	0.92	29.5
All Vehicles		567	0.0	597	0.0	0.603	24.5	LOS C	7.3	51.1	0.93	0.76	0.95	31.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Pretoria St NB												
P1	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	200.9	211.9	1.05
East: High St WB												
P2	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	200.9	211.9	1.05

North: Melling Link SB											
P3	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	200.9	211.9	1.05
West: High St EB											
P4	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	200.9	211.9	1.05
All Pedestrians		200	211	24.4	LOS C	0.1	0.1	0.90	0.90	200.9	211.9	1.05

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 104 [High St / Pretoria St Int PM peak (Site Folder: North Hutt CBD Intersections)]

Option_1_2036_PM Peak
Site Category: Proposed Design 1
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Pretoria St														
1	L2	3	0.0	3	0.0	0.184	32.1	LOS C	1.0	7.1	0.94	0.69	0.94	31.1
2	T1	31	0.0	33	0.0	*0.184	27.5	LOS C	1.0	7.1	0.94	0.69	0.94	30.1
3	R2	203	0.0	214	0.0	*0.628	30.6	LOS C	6.2	43.2	0.97	0.83	1.02	32.2
Approach		237	0.0	249	0.0	0.628	30.3	LOS C	6.2	43.2	0.97	0.81	1.01	32.0
East: High St East														
4	L2	153	0.0	161	0.0	0.442	24.1	LOS C	5.6	38.9	0.87	0.77	0.87	35.5
5	T1	60	0.0	63	0.0	0.442	19.6	LOS B	5.6	38.9	0.87	0.77	0.87	31.0
6	R2	15	0.0	16	0.0	*0.085	32.5	LOS C	0.4	3.1	0.94	0.68	0.94	24.6
Approach		228	0.0	240	0.0	0.442	23.5	LOS C	5.6	38.9	0.87	0.76	0.87	33.9
North: Melling Link														
7	L2	1	0.0	1	0.0	0.010	30.5	LOS C	0.1	0.4	0.90	0.58	0.90	26.5
8	T1	1	0.0	1	0.0	0.010	25.9	LOS C	0.1	0.4	0.90	0.58	0.90	30.0
9	R2	17	0.0	18	0.0	0.053	26.9	LOS C	0.4	3.1	0.85	0.68	0.85	22.0
Approach		19	0.0	20	0.0	0.053	27.0	LOS C	0.4	3.1	0.86	0.67	0.86	22.9
West: High St West														
10	L2	12	0.0	13	0.0	0.684	29.1	LOS C	8.3	58.1	0.97	0.86	1.05	23.2
11	T1	262	0.0	276	0.0	*0.684	24.6	LOS C	8.3	58.1	0.97	0.86	1.05	30.1
12	R2	3	0.0	3	0.0	0.017	31.8	LOS C	0.1	0.6	0.92	0.62	0.92	29.4
Approach		277	0.0	292	0.0	0.684	24.9	LOS C	8.3	58.1	0.97	0.86	1.05	29.8
All Vehicles		761	0.0	801	0.0	0.684	26.2	LOS C	8.3	58.1	0.94	0.81	0.98	31.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Pretoria St												
P1	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	200.9	211.9	1.05
East: High St East												
P2	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	200.9	211.9	1.05

North: Melling Link											
P3	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	200.9	211.9	1.05
West: High St West											
P4	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	200.9	211.9	1.05
All Pedestrians		200	211	24.4	LOS C	0.1	0.1	0.90	0.90	200.9	211.9	1.05

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Rutherford St / Melling Link Int -AM peak (Site Folder: North Hutt CBD Intersections)]

Option_1_2036_AM Peak
Site Category: Proposed Design 1
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 88 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Queens Drive NB														
1	L2	2	0.0	2	0.0	0.557	41.9	LOS D	7.0	49.2	0.97	0.79	0.97	22.7
2	T1	326	0.0	343	0.0	0.557	37.7	LOS D	7.1	49.6	0.97	0.79	0.97	20.0
3	R2	15	0.0	16	0.0	* 0.125	48.5	LOS D	0.7	4.7	0.97	0.69	0.97	13.7
Approach		343	0.0	361	0.0	0.557	38.2	LOS D	7.1	49.6	0.97	0.78	0.97	19.7
East: Rutherford St WB														
4	L2	13	0.0	14	0.0	0.539	42.6	LOS D	6.3	44.4	0.97	0.78	0.97	16.2
5	T1	134	0.0	141	0.0	* 0.539	38.1	LOS D	6.3	44.4	0.97	0.78	0.97	24.7
6	R2	319	0.0	336	0.0	* 0.884	57.3	LOS E	8.4	59.1	1.00	1.04	1.49	17.3
Approach		466	0.0	491	0.0	0.884	51.4	LOS D	8.4	59.1	0.99	0.96	1.32	19.2
North: Melling Link SB														
7	L2	606	0.0	638	0.0	0.617	18.7	LOS B	18.4	128.8	0.73	0.80	0.73	30.6
8	T1	656	0.0	691	0.0	* 0.931	46.7	LOS D	37.2	260.2	0.98	1.17	1.34	17.5
9	R2	321	0.0	338	0.0	0.572	31.8	LOS C	12.2	85.6	0.89	0.82	0.89	28.8
Approach		1583	0.0	1666	0.0	0.931	33.0	LOS C	37.2	260.2	0.87	0.95	1.01	24.1
West: Rutherford St EB														
10	L2	131	0.0	138	0.0	0.145	16.6	LOS B	3.1	21.6	0.56	0.69	0.56	35.8
11	T1	40	0.0	42	0.0	0.146	36.0	LOS D	1.6	11.3	0.91	0.67	0.91	25.5
12	R2	7	0.0	7	0.0	0.039	44.0	LOS D	0.3	2.1	0.93	0.66	0.93	20.7
Approach		178	0.0	187	0.0	0.146	22.1	LOS C	3.1	21.6	0.65	0.69	0.65	32.4
All Vehicles		2570	0.0	2705	0.0	0.931	36.2	LOS D	37.2	260.2	0.89	0.91	1.04	23.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Queens Drive NB												
P1	Full	50	53	38.3	LOS D	0.1	0.1	0.93	0.93	217.6	215.2	0.99
East: Rutherford St WB												
P2	Full	50	53	38.3	LOS D	0.1	0.1	0.93	0.93	217.6	215.2	0.99

North: Melling Link SB												
P3	Full	50	53	38.3	LOS D	0.1	0.1	0.93	0.93	222.0	220.5	0.99
West: Rutherford St EB												
P4	Full	50	53	38.3	LOS D	0.1	0.1	0.93	0.93	218.5	216.2	0.99
All Pedestrians		200	211	38.3	LOS D	0.1	0.1	0.93	0.93	218.9	216.8	0.99

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Ruthurford St / Melling Link Int - PM peak (Site Folder: North Hutt CBD Intersections)]

Option_1_2036_PM Peak
Site Category: Proposed Design 1
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 88 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Queens Drive NB														
1	L2	1	0.0	1	0.0	0.915	53.5	LOS D	27.0	189.0	1.00	1.17	1.37	19.4
2	T1	961	0.0	1012	0.0	* 0.915	48.9	LOS D	27.0	189.0	1.00	1.16	1.37	17.0
3	R2	2	0.0	2	0.0	0.010	42.3	LOS D	0.1	0.6	0.91	0.61	0.91	15.1
Approach		964	0.0	1015	0.0	0.915	48.9	LOS D	27.0	189.0	1.00	1.16	1.36	17.0
East: Rutherford St WB														
4	L2	20	0.0	21	0.0	0.448	33.5	LOS C	8.2	57.4	0.88	0.74	0.88	19.2
5	T1	196	0.0	206	0.0	0.448	29.0	LOS C	8.2	57.4	0.88	0.74	0.88	28.0
6	R2	552	0.0	581	0.0	* 0.918	59.3	LOS E	15.5	108.3	1.00	1.08	1.50	16.9
Approach		768	0.0	808	0.0	0.918	50.9	LOS D	15.5	108.3	0.97	0.98	1.32	19.2
North: Queens Drive SB														
7	L2	643	0.0	677	0.0	0.729	23.2	LOS C	22.9	160.0	0.85	0.84	0.85	28.1
8	T1	462	0.0	486	0.0	0.878	42.6	LOS D	23.7	166.1	1.00	1.08	1.26	18.5
9	R2	191	0.0	201	0.0	0.953	68.7	LOS E	11.4	79.7	1.00	1.17	1.72	19.4
Approach		1296	0.0	1364	0.0	0.953	36.8	LOS D	23.7	166.1	0.92	0.98	1.12	22.6
West: Rutherford St EB														
10	L2	454	0.0	478	0.0	* 0.943	60.0	LOS E	26.8	187.7	0.98	1.10	1.48	20.9
11	T1	256	0.0	269	0.0	0.932	57.6	LOS E	14.6	102.1	1.00	1.18	1.57	19.7
12	R2	45	0.0	47	0.0	0.374	49.9	LOS D	2.1	14.6	0.99	0.74	0.99	19.2
Approach		755	0.0	795	0.0	0.943	58.6	LOS E	26.8	187.7	0.99	1.11	1.48	20.4
All Vehicles		3783	0.0	3982	0.0	0.953	47.1	LOS D	27.0	189.0	0.96	1.05	1.30	20.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Queens Drive NB												
P1	Full	50	53	38.3	LOS D	0.1	0.1	0.93	0.93	217.6	215.2	0.99
East: Rutherford St WB												
P2	Full	50	53	38.3	LOS D	0.1	0.1	0.93	0.93	217.6	215.2	0.99

North: Queens Drive SB												
P3	Full	50	53	38.3	LOS D	0.1	0.1	0.93	0.93	222.0	220.5	0.99
West: Rutherford St EB												
P4	Full	50	53	38.3	LOS D	0.1	0.1	0.93	0.93	218.5	216.2	0.99
All Pedestrians		200	211	38.3	LOS D	0.1	0.1	0.93	0.93	218.9	216.8	0.99

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 102 [High St / Queens Dr Int AM Peak (Site Folder: North Hutt CBD Intersections)]

Option_1_2036_AM Peak
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Queens Drive NB														
1	L2	14	0.0	15	0.0	0.554	25.7	LOS C	7.0	49.3	0.91	0.77	0.91	29.2
2	T1	242	0.0	255	0.0	0.554	21.1	LOS C	7.0	49.3	0.91	0.77	0.91	18.2
3	R2	43	0.0	45	0.0	0.244	33.4	LOS C	1.3	9.2	0.96	0.73	0.96	18.0
Approach		299	0.0	315	0.0	0.554	23.1	LOS C	7.0	49.3	0.92	0.76	0.92	18.9
East: High St WB														
4	L2	81	0.0	85	0.0	0.749	33.5	LOS C	7.0	49.2	1.00	0.94	1.21	19.3
5	T1	132	0.0	139	0.0	*0.749	28.9	LOS C	7.0	49.2	1.00	0.94	1.21	27.7
6	R2	67	0.0	71	0.0	*0.380	34.0	LOS C	2.1	14.6	0.97	0.75	0.97	17.4
Approach		280	0.0	295	0.0	0.749	31.5	LOS C	7.0	49.2	0.99	0.89	1.15	23.4
North: Queens Drive SB														
7	L2	178	0.0	187	0.0	0.242	16.9	LOS B	3.6	25.2	0.69	0.73	0.69	26.0
8	T1	346	0.0	364	0.0	*0.747	25.2	LOS C	10.8	75.7	0.98	0.92	1.11	16.4
9	R2	138	0.0	145	0.0	*0.782	38.0	LOS D	4.8	33.5	1.00	0.94	1.35	22.2
Approach		662	0.0	697	0.0	0.782	25.6	LOS C	10.8	75.7	0.90	0.87	1.05	20.5
West: High St EB														
10	L2	31	0.0	33	0.0	0.055	20.0	LOS C	0.7	4.7	0.72	0.68	0.72	29.2
11	T1	61	0.0	64	0.0	0.220	25.3	LOS C	1.7	12.1	0.92	0.69	0.92	30.1
12	R2	7	0.0	7	0.0	0.040	32.2	LOS C	0.2	1.4	0.93	0.65	0.93	24.1
Approach		99	0.0	104	0.0	0.220	24.1	LOS C	1.7	12.1	0.86	0.69	0.86	29.4
All Vehicles		1340	0.0	1411	0.0	0.782	26.2	LOS C	10.8	75.7	0.92	0.84	1.03	21.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Queens Drive NB												
P1	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	200.9	211.9	1.05
East: High St WB												
P2	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	200.9	211.9	1.05

North: Queens Drive SB											
P3	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	206.4	218.5	1.06
West: High St EB											
P4	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	203.7	215.2	1.06
All Pedestrians		200	211	24.4	LOS C	0.1	0.1	0.90	0.90	203.0	214.4	1.06

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 102 [High St / Queens Dr Int- PM peak (Site Folder: North Hutt CBD Intersections)]

Option_1_2036_PM Peak
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Queens Drive NB														
1	L2	13	0.0	14	0.0	0.899	43.9	LOS D	36.3	254.0	1.00	1.09	1.23	21.8
2	T1	666	0.0	701	0.0	*0.899	39.3	LOS D	36.3	254.0	1.00	1.09	1.23	11.9
3	R2	9	0.0	9	0.0	0.077	49.3	LOS D	0.4	2.9	0.96	0.67	0.96	13.9
Approach		688	0.0	724	0.0	0.899	39.5	LOS D	36.3	254.0	1.00	1.08	1.23	12.2
East: High St WB														
4	L2	40	0.0	42	0.0	0.308	37.5	LOS D	4.3	30.1	0.89	0.73	0.89	17.9
5	T1	68	0.0	72	0.0	0.308	33.0	LOS C	4.3	30.1	0.89	0.73	0.89	26.2
6	R2	56	0.0	59	0.0	*0.476	51.6	LOS D	2.7	18.8	1.00	0.75	1.00	13.2
Approach		164	0.0	173	0.0	0.476	40.4	LOS D	4.3	30.1	0.93	0.74	0.93	19.8
North: Queens Drive SB														
7	L2	138	0.0	145	0.0	0.150	16.4	LOS B	3.3	22.9	0.55	0.69	0.55	26.3
8	T1	334	0.0	352	0.0	0.491	20.5	LOS C	11.1	77.6	0.77	0.66	0.77	18.7
9	R2	56	0.0	59	0.0	*0.476	51.6	LOS D	2.7	18.8	1.00	0.75	1.00	18.6
Approach		528	0.0	556	0.0	0.491	22.7	LOS C	11.1	77.6	0.73	0.68	0.73	20.6
West: High St WB														
10	L2	220	0.0	232	0.0	0.416	31.9	LOS C	8.2	57.5	0.85	0.79	0.85	23.8
11	T1	274	0.0	288	0.0	*0.942	60.6	LOS E	16.3	113.9	1.00	1.21	1.60	19.3
12	R2	5	0.0	5	0.0	0.043	48.9	LOS D	0.2	1.6	0.96	0.64	0.96	19.1
Approach		499	0.0	525	0.0	0.942	47.8	LOS D	16.3	113.9	0.93	1.02	1.26	20.8
All Vehicles		1879	0.0	1978	0.0	0.942	37.1	LOS D	36.3	254.0	0.90	0.92	1.07	17.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Queens Drive NB												
P1	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	215.9	211.9	0.98
East: High St WB												
P2	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	215.9	211.9	0.98

North: Queens Drive SB											
P3 Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	221.4	218.5	0.99
West: High St WB											
P4 Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	218.6	215.2	0.98
All Pedestrians	200	211	39.3	LOS D	0.1	0.1	0.94	0.94	217.9	214.4	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101v [Ewen Queens AM - NoPeds (Site Folder: South Hutt CBD Intersections)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 64 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Woburn Road														
1	L2	715	0.0	753	0.0	0.541	18.6	LOS B	10.4	72.9	0.73	0.79	0.73	45.0
3a	R1	134	0.0	141	0.0	* 0.541	34.2	LOS C	7.0	48.9	0.97	0.79	0.99	33.4
Approach		849	0.0	894	0.0	0.541	21.1	LOS C	10.4	72.9	0.77	0.79	0.77	43.2
NorthEast: Queens Drive														
24a	L1	77	0.0	81	0.0	0.097	17.0	LOS B	1.5	10.4	0.62	0.68	0.62	43.7
26a	R1	693	0.0	729	0.0	* 0.763	31.7	LOS C	11.7	81.7	0.98	0.92	1.13	34.7
Approach		770	0.0	811	0.0	0.763	30.3	LOS C	11.7	81.7	0.95	0.89	1.08	35.5
West: Ewen Bridge														
10a	L1	933	0.0	982	0.0	0.744	10.4	LOS B	14.6	102.1	0.57	0.75	0.57	47.4
12	R2	602	0.0	634	0.0	* 0.744	25.3	LOS C	15.6	109.1	0.89	0.86	0.95	42.1
Approach		1535	0.0	1616	0.0	0.744	16.2	LOS B	15.6	109.1	0.70	0.79	0.72	44.8
All Vehicles		3154	0.0	3320	0.0	0.763	21.0	LOS C	15.6	109.1	0.78	0.82	0.82	42.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 101v [Ewen Queens PM - NoPeds (Site Folder: South Hutt CBD Intersections)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 88 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Woburn Road														
1	L2	687	0.0	723	0.0	0.491	23.7	LOS C	11.2	78.7	0.73	0.79	0.73	42.4
3a	R1	74	0.0	78	0.0	* 0.491	46.7	LOS D	10.4	73.1	0.97	0.76	0.97	28.9
Approach		761	0.0	801	0.0	0.491	26.0	LOS C	11.2	78.7	0.76	0.78	0.76	40.9
NorthEast: Queens Drive														
24a	L1	345	0.0	363	0.0	0.380	21.2	LOS C	9.6	67.0	0.66	0.74	0.66	41.6
26a	R1	1085	0.0	1142	0.0	* 0.847	38.8	LOS D	26.5	185.7	0.97	0.96	1.13	31.9
Approach		1430	0.0	1505	0.0	0.847	34.5	LOS C	26.5	185.7	0.90	0.90	1.02	33.8
West: Ewen Bridge														
10a	L1	1086	0.0	1143	0.0	0.808	9.1	LOS A	23.4	163.8	0.53	0.75	0.53	48.5
12	R2	719	0.0	757	0.0	* 0.831	36.3	LOS D	25.4	178.0	0.92	0.90	1.02	37.5
Approach		1805	0.0	1900	0.0	0.831	19.9	LOS B	25.4	178.0	0.69	0.81	0.72	42.6
All Vehicles		3996	0.0	4206	0.0	0.847	26.3	LOS C	26.5	185.7	0.78	0.84	0.84	39.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [CCG Site]

Network: N901 [AM OP2 Marsden/Railway CCG Network - Import (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 60 seconds (Network Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance (CCG)

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Site: 901 [AM OP2 Marsden/Railway N-INT1 - Import]														
South: Victoria Street (South - Mid Block)														
2	T1	167	0.0	167	0.0	0.117	0.2	LOS A	0.1	0.8	0.02	0.02	0.02	49.7
3	R2	475	0.0	475	0.0	0.548	8.5	LOS A	5.4	38.1	0.41	0.69	0.41	39.7
Approach		642	0.0	642	0.0	0.548	6.4	LOS A	5.4	38.1	0.31	0.52	0.31	41.9
North: Marsden Street														
7	L2	146	0.0	146	0.0	0.524	31.5	LOS C	4.2	29.3	0.97	0.79	0.97	34.7
8	T1	255	0.0	255	0.0	0.713	27.5	LOS C	7.7	53.7	0.99	0.89	1.13	28.6
Approach		401	0.0	401	0.0	0.713	28.9	LOS C	7.7	53.7	0.98	0.86	1.07	31.6
West: Railway Avenue East Off Ramp														
10	L2	5	0.0	5	0.0	0.118	32.9	LOS C	0.6	4.0	0.94	0.69	0.94	34.2
12	R2	15	0.0	15	0.0	* 0.118	32.9	LOS C	0.6	4.0	0.94	0.69	0.94	26.4
Approach		20	0.0	20	0.0	0.118	32.9	LOS C	0.6	4.0	0.94	0.69	0.94	29.1
All Vehicles		1063	0.0	1063	0.0	0.713	15.4	LOS B	7.7	53.7	0.58	0.65	0.61	36.4
Site: 902 [AM OP2 Marsden/Railway S-INT2 - Import]														
South: Victoria Street (South)														
1	L2	12	0.0	12	0.0	* 0.503	23.7	LOS C	7.2	50.7	0.87	0.74	0.87	39.2
2	T1	537	0.0	537	0.0	0.503	19.2	LOS B	7.2	50.7	0.87	0.74	0.87	32.8
Approach		549	0.0	549	0.0	0.503	19.3	LOS B	7.2	50.7	0.87	0.74	0.87	33.0
East: Railway Avenue East Off Ramp														
4	L2	482	0.0	482	0.0	0.445	12.2	LOS B	8.0	55.9	0.60	0.74	0.60	42.5
6	R2	105	0.0	105	0.0	0.324	28.1	LOS C	2.8	19.3	0.90	0.77	0.90	28.3
Approach		587	0.0	587	0.0	0.445	15.0	LOS B	8.0	55.9	0.66	0.75	0.66	40.5
North: Victoria Street (North - Mid Block)														
8	T1	269	0.0	269	0.0	0.558	10.0	LOS B	4.5	31.3	0.57	0.48	0.57	39.8
9	R2	3	0.0	3	0.0	0.558	13.2	LOS B	4.5	31.3	0.57	0.48	0.57	38.8
Approach		272	0.0	272	0.0	0.558	10.0	LOS B	4.5	31.3	0.57	0.48	0.57	39.8
All Vehicles		1408	0.0	1408	0.0	0.558	15.7	LOS B	8.0	55.9	0.72	0.69	0.72	37.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov	Dem.	Aver.	Level of	AVERAGE BACK OF	Prop.	Effective	Travel	Travel	Aver.

ID	Crossing	Flow	Delay	Service	QUEUE [Ped	Dist]	Que	Stop Rate	Time	Dist.	Speed
		ped/h	sec		ped	m			sec	m	m/sec
Site: 901 [AM OP2 Marsden/Railway N-INT1 - Import]											
East: Railway Avenue West On Ramp											
P2	Full	50	24.4	LOS C	0.1	0.1	0.90	0.90	182.3	205.3	1.13
North: Marsden Street											
P3	Full	50	24.4	LOS C	0.1	0.1	0.90	0.90	187.4	211.9	1.13
West: Railway Avenue East Off Ramp											
P4	Full	50	24.4	LOS C	0.1	0.1	0.90	0.90	182.3	205.3	1.13
All Pedestrians		150	24.4	LOS C	0.1	0.1	0.90	0.90	184.0	207.5	1.13
Site: 902 [AM OP2 Marsden/Railway S-INT2 - Import]											
South: Victoria Street (South)											
P1	Full	50	24.4	LOS C	0.1	0.1	0.90	0.90	187.4	211.9	1.13
East: Railway Avenue East Off Ramp											
P2	Full	50	24.4	LOS C	0.1	0.1	0.90	0.90	184.8	208.6	1.13
West: Railway Avenue West On Ramp											
P4	Full	50	24.4	LOS C	0.1	0.1	0.90	0.90	182.3	205.3	1.13
All Pedestrians		150	24.4	LOS C	0.1	0.1	0.90	0.90	184.8	208.6	1.13

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [CCG Site]

Network: N901 [PM OP2 Marsden/Railway CCG Network - Import (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 85 seconds (Network Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance (CCG)

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Site: 901 [PM OP2 Marsden/Railway N-INT1 - Import]														
South: Victoria Street (South - Mid Block)														
2	T1	309	0.0	309	0.0	0.201	0.3	LOS A	0.3	2.2	0.03	0.02	0.03	49.7
3	R2	623	0.0	623	0.0	0.695	9.5	LOS A	8.2	57.1	0.44	0.71	0.44	38.9
Approach		932	0.0	932	0.0	0.695	6.5	LOS A	8.2	57.1	0.30	0.48	0.30	41.9
North: Marsden Street														
7	L2	263	0.0	263	0.0	0.634	37.6	LOS D	10.1	71.0	0.96	0.83	0.96	32.8
8	T1	102	0.0	102	0.0	0.212	27.7	LOS C	3.4	23.8	0.83	0.66	0.83	28.5
Approach		365	0.0	365	0.0	0.634	34.8	LOS C	10.1	71.0	0.92	0.78	0.92	32.0
West: Railway Avenue East Off Ramp														
10	L2	8	0.0	8	0.0	0.110	44.5	LOS D	0.7	4.8	0.94	0.69	0.94	30.9
12	R2	9	0.0	9	0.0	* 0.110	44.5	LOS D	0.7	4.8	0.94	0.69	0.94	22.7
Approach		17	0.0	17	0.0	0.110	44.5	LOS D	0.7	4.8	0.94	0.69	0.94	27.3
All Vehicles		1314	0.0	1314	0.0	0.695	14.8	LOS B	10.1	71.0	0.48	0.57	0.48	37.2
Site: 902 [PM OP2 Marsden/Railway S-INT2 - Import]														
South: Victoria Street (South)														
1	L2	18	0.0	18	0.0	0.900	50.9	LOS D	23.8	166.9	1.00	1.16	1.38	30.3
2	T1	692	0.0	692	0.0	* 0.900	49.3	LOS D	23.8	166.9	1.00	1.18	1.46	21.3
Approach		710	0.0	710	0.0	0.900	49.3	LOS D	23.8	166.9	1.00	1.18	1.46	21.6
East: Railway Avenue East Off Ramp														
4	L2	575	0.0	575	0.0	0.470	12.2	LOS B	11.7	81.7	0.53	0.72	0.53	42.5
6	R2	240	0.0	240	0.0	* 0.785	40.4	LOS D	10.6	74.5	0.96	0.94	1.19	23.8
Approach		815	0.0	815	0.0	0.785	20.5	LOS C	11.7	81.7	0.66	0.79	0.73	37.4
North: Victoria Street (North - Mid Block)														
8	T1	111	0.0	111	0.0	0.276	29.9	LOS C	4.3	30.3	0.90	0.72	0.90	28.3
9	R2	9	0.0	9	0.0	0.276	33.0	LOS C	4.3	30.3	0.90	0.72	0.90	27.8
Approach		120	0.0	120	0.0	0.276	30.1	LOS C	4.3	30.3	0.90	0.72	0.90	28.2
All Vehicles		1645	0.0	1645	0.0	0.900	33.7	LOS C	23.8	166.9	0.82	0.95	1.05	29.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov	Dem.	Aver.	Level of	AVERAGE BACK OF	Prop.	Effective	Travel	Travel	Aver.

ID	Crossing	Flow	Delay	Service	QUEUE [Ped	Dist]	Que	Stop Rate	Time	Dist.	Speed
		ped/h	sec		ped	m			sec	m	m/sec
Site: 901 [PM OP2 Marsden/Railway N-INT1 - Import]											
East: Railway Avenue West On Ramp											
P2	Full	50	36.8	LOS D	0.1	0.1	0.93	0.93	194.7	205.3	1.05
North: Marsden Street											
P3	Full	50	36.8	LOS D	0.1	0.1	0.93	0.93	199.8	211.9	1.06
West: Railway Avenue East Off Ramp											
P4	Full	50	36.8	LOS D	0.1	0.1	0.93	0.93	194.7	205.3	1.05
All Pedestrians		150	36.8	LOS D	0.1	0.1	0.93	0.93	196.4	207.5	1.06
Site: 902 [PM OP2 Marsden/Railway S-INT2 - Import]											
South: Victoria Street (South)											
P1	Full	50	36.8	LOS D	0.1	0.1	0.93	0.93	199.8	211.9	1.06
East: Railway Avenue East Off Ramp											
P2	Full	50	36.8	LOS D	0.1	0.1	0.93	0.93	197.3	208.6	1.06
West: Railway Avenue West On Ramp											
P4	Full	50	36.8	LOS D	0.1	0.1	0.93	0.93	194.7	205.3	1.05
All Pedestrians		150	36.8	LOS D	0.1	0.1	0.93	0.93	197.3	208.6	1.06

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Appendix B – Road Classification

Road Name	Classification
State Highway 2	National
Melling Link	Arterial
Ewen Bridge	Arterial
Pharazyn Street	Arterial
Marsden Street	Primary Collector
Pretoria Street	Secondary Collector
Rutherford Street	Arterial
High Street	Arterial & Primary Collector
Queens Drive	Arterial
Daly Street	Secondary Collector
Bloomsfield Drive	Primary Collector
Cornwall Street	Primary Collector
Andrews Avenue	Secondary Collector
Dudley Street	Primary Collector

Appendix C – Existing traffic volumes

Road Name	AADT	HCV %
SH2 south of Melling	37,520	5.7%
SH2 north of Melling	31,715	5.4%
Melling Link	22,376	3.0%
Ewen Bridge	32,180	4.1%
Pharazyn Street	5,995	3.3%
Marsden Street	7,745	6.3%
Pretoria Street	3,885	0.9%
Rutherford Street adj #11	16,495	4.2%
Rutherford Street adj #41	16,654	4.9%
Rutherford Street adj #63	10,372	5.2%
High Street adj #423	11,500	2.9%
High Street adj #339	12,660	2.7%
High Street adj #261	6,950	3.4%
High Street adj #181	4,665	5.8%
High Street adj Fraser Street	10,885	2.3%
Queens Drive adj # 151	8,890	8.1%
Queens Drive adj # 134	12,680	7.0%
Queens Drive adj # 131	11,075	7.1%
Queens Drive adj # 103	7,805	0.8%
Queens Drive adj # 77	7,820	6.6%
Queens Drive adj # 11	10,115	6.6%
Daly Street north	6,035	2.2%
Daly Street south	6,940	2.4%
Bloomsfield Drive	7,181	1.4%
Cornwall Street	8,083	5.3%
Andrews Avenue	2,035	0.7%
Dudley Street	6,055	0.6%

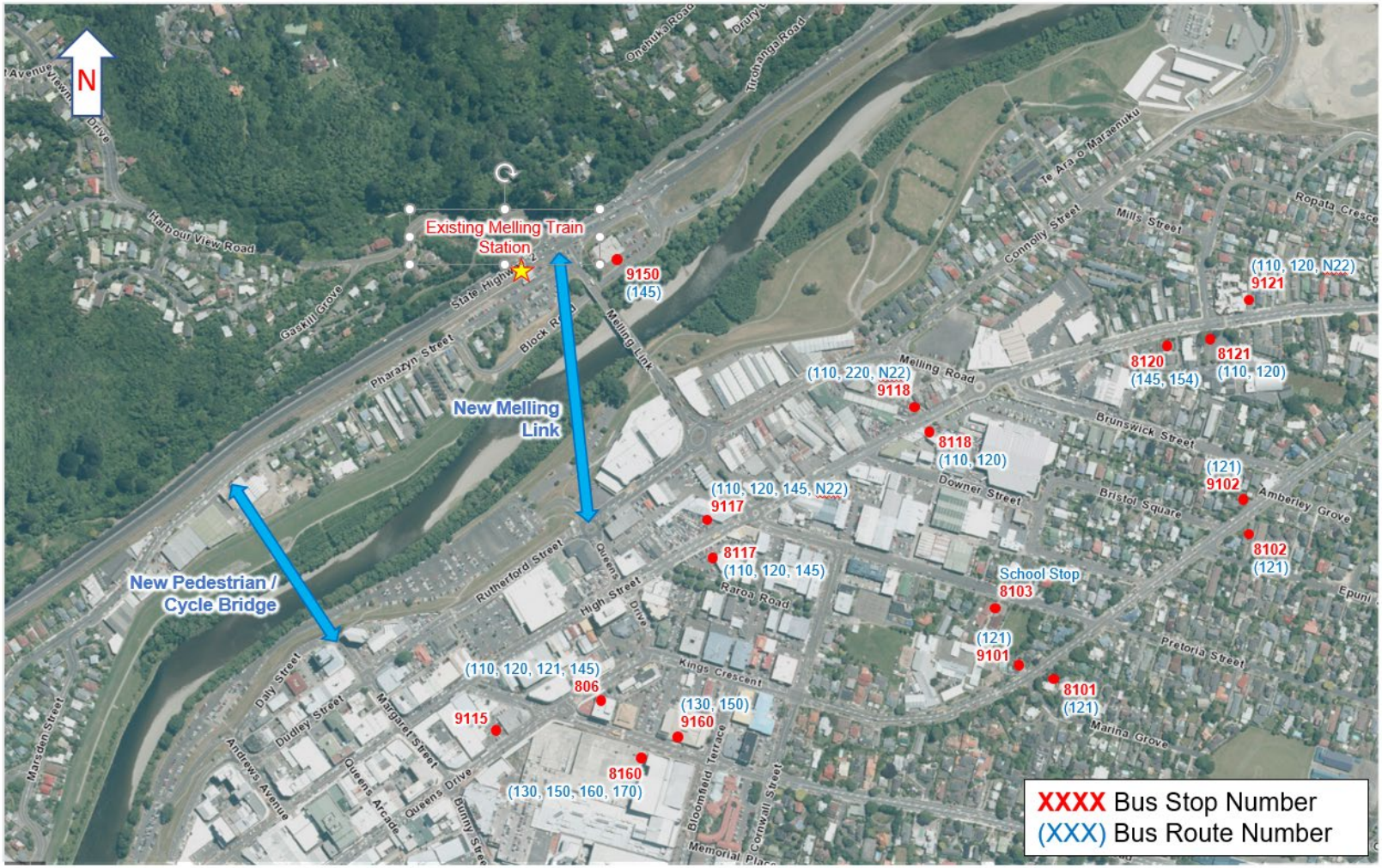
Appendix D – Existing Bus Network

The details of the public bus routes and their service frequency in the study area are listed in Table 8 below and the locations of stops on the following figure. There are additional School Bus services that are not listed.

Table 8 - Metlink Public Bus Routes

Route Details	Route Details	Frequency	Streets Served in Study Area
83 – Standard bus route	Eastbourne – Lower Hutt – Wellington (Mon – Sun)	30 minutes daytime 30-60 minutes evenings & weekends	Queens Drive, Bunny Street, Knights Road and Woburn Road
110 – High frequency route	Upper Hutt – Petone (Mon - Sun)	10-15 minutes daytime 15-60 minutes evenings & weekends	High Street, Queens Drive, Bunny Street, Knights Road
120 – High frequency route	Stokes Valley – Lower Hutt (Mon-Sun)	10-15 minutes daytime 15-60 minutes evenings & weekends	High Street, Queens Drive and Bunny Street
130 High frequency route	Naenae - – Lower Hutt – Petone (Mon – Sun)	10-15 minutes daytime 15-60 minutes evenings & weekends	Knights Road, Waterloo Road, Queens Drive, Bunny St, and Woburn Road.
150 Standard bus route	Kelson - Lower Hutt – Maungaraki – Petone (Mon – Sun)	20-30 minutes daytime 30-60 minutes evenings & weekends	Knights Road, Cornwall St, Waterloo Road, Queens Drive, Bunny St, Railway Ave, and Bridge St
160 Standard bus route	Wainuiomata North – Waterloo – Lower Hutt (Mon – Sun)	30-60 minutes all day increased frequency at peak times	Knights Road, Bunny St, Queens Drive, and Waterloo Road.
170 Standard bus route	Wainuiomata South – Waterloo - Lower Hutt (Mon – Sun)	30-60 minutes all day increased frequency at peak times	Queens Drive, Bunny St, Knights Road, and Waterloo Road.

Route Details	Route Details	Frequency	Streets Served in Study Area
145 Standard bus route	Belmont – Melling -Lower Hutt (Mon – Sat)	40-60 minutes all day	Block road, Melling Link, High St, Queens Drive, Knights Road, Cornwall St, and Waterloo Road.
121 Standard bus route	Stokes Valley Heights – Naenae – Lower Hutt – Seaview (Mon – Sat)	30-60 minutes all day increased frequency at peak times	Queens Drive, Bunny St, Kings Crescent, and Knights Road
N8 After Midnight bus route (Sat & Sun)	Lower Hutt – Petone – Wellington	Two services	Queens Drive, Knights Road, and Bunny St.
N22 After Midnight bus route (Sat & Sun)	Wellington – Naenae – Stokes Valley – Upper Hutt	Three services	Queens Drive, and High St.
N66 After Midnight bus route (Sat & Sun)	Wellington – Lower Hutt – Waterloo - Wainuiomata	Two services	Waterloo Road, Cornwall St, Knights Road, Queens Drive and Bunny St.
N88 After Midnight bus route (Sat & Sun)	Eastbourne – Lower Hutt – Petone – Wellington	Two services	Queens Drive, Bunny Street Knights Road and Woburn Road.



Bus routes and stops in central Hutt

Appendix E – Historic Crash Analysis

State Highway 2

1. In the Lower Hutt Region, there were 86 reported injury crashes over the last five years from 2016 to 2020. Approximately 68% of injury crashes occurred in overcast or dark environment and 27% in wet environment. Motorcycle was involved in 26% of the injury crashes.

2. One fatal crash in 2016 at the Melling interchange was the result of a vehicle turning into the wrong carriageway and colliding with an oncoming vehicle.

3. The most prevalent crash type is rear end/obstruction. This primary crash type represents 180 out of 333 (54%) total crashes.

4. The second most prevalent crash types are overtaking (18%) and straight-lost control/head on (15%) crashes.

5. Approximately 44% of all reported crashes occurred at intersections.

Melling Link

6. On Melling Link, there were four reported injury crashes from 2016 to 2020, 75% of these were rear end/obstruction type. And there were no heavy vehicle or vulnerable road users involved.

7. There were no fatal or serious injury crashes over the period.

8. The most prevalent crash type is rear end/obstruction. This primary crash type represents 62% of the total crashes.

9. Approximately 92% of all reported crashes occurred at intersections.

Ewen Bridge

10. There were no injury crashes on Ewen Bridge within the recent five years. No heavy vehicle or vulnerable road users were involved.

11. The most prevalent crash types are rear end/obstruction (50%) and overtaking (40%).

12. Approximately 80% of all reported crashes occurred at intersections.

Pharazyn Street

13. There were 11 injury crashes, including three serious injury crashes, on Pharazyn Street over the study period. There were no heavy vehicle or vulnerable road users involved.

14. Out of the three serious injury crashes, there were two bend-lost control/head on crashes in 2016 and 2019 involving an alcohol suspected driver hit parked vehicle and a driver distracted by cell phone hit front vehicle. A straight-lost control/head on crash in 2020 involved an alcohol suspected driver who lost control, went off the road and hit a light pole.

15. The most prevalent crash types are rear end/obstruction (40%) and crossing/turning (35%). Out of 11 injury crashes, 5 of them were crossing/turning type.

16. Approximately 28% of all reported crashes occurred at intersections.

Marsden Street

17. There was one injury crash within the recent 5 years, which was a serious injury crash in 2017. There were no heavy vehicle or vulnerable road users involved.
18. This was a crossing/turning crash involved a driver on Marsden Street hit by a Van which failed to give way due to slippery road in rain, this resulted in a serious injury crash.
19. The most prevalent crash types are crossing/turning (64%) and rear end/obstruction (27%).
20. Approximately half of the reported crashes occurred in dark environment.
21. Approximately 73% of all reported crashes occurred at intersections.

Pretoria Street

22. There were five reported injury crashes from 2016 to 2020. Two injury crashes had pedestrian and cyclist involved, and no heavy vehicles were involved in any of the reported injury crashes.
23. There was one serious injury crash with pedestrian involved. This was the result of a driver on Pretoria Street manoeuvring and failing to notice and give-way to a crossing wheeled pedestrian (age 50).
24. One cyclist was involved in a minor injury crash occurred in 2018.
25. The most prevalent crash types are crossing/turning (52%) and rear end/obstruction (33%).
26. All injury crashes occurred in dry and bright environment.
27. Approximately 81% of all reported crashes occurred at intersections

Rutherford Street

28. There were three injury crashes within the recent five years, which were all minor injury crashes. There were no heavy vehicle or vulnerable road users involved.
29. One motorcycle was involved in the minor injury crash occurred in 2016. And the other two minor injury crashes both occurred in overcast and wet environment.
30. There were no fatal or serious injury crashes.
31. The most prevalent crash types are rear end/obstruction (43%) and crossing/turning (43%). Approximately 61% of all crashes occurred in overcast or dark environment.
32. Approximately 72% of all reported crashes occurred at intersections.

High Street

33. There were 53 injury crashes within the 5-year study period. Approximately 13% of the injury crashes were heavy vehicle involved and 43% were vulnerable road users involved.
34. There were six serious injury crashes. All of them occurred in bright and dry environment. Out of six serious injury crashes, two of them

were pedestrians involved. There was no prevalent crash type in the rest.

35. Out of all reported crashes. the most prevalent crash type was rear end/obstruction (55%). Approximately 26% were crossing/turning crashes and 10% were straight-lost control/head on crashes.

36. Approximately 60% of all reported crashes occurred at intersections.

Queens Drive

37. There were 13 reported injury crashes within the 5-year study period. Two of these were heavy vehicle involved and eight of these were vulnerable users involved. Approximately half of the injury crashes occurred in overcast or dark environment.

38. There were five serious injury crashes, which three of them were pedestrian involved.

39. The most prevalent crash types were rear end/obstruction (36%) and overtaking (24%). Other crash types including crossing/turning, bend-lost control/head on and pedestrian vs vehicle also resulted in approximately 10 to 11% each towards all reported crashes within the study period.

40. Within the study area, Queens Drive and High Street both have the highest pedestrian involved crash rate (11%).

41. Approximately 86% of all reported crashes occurred at intersections.

Daly Street

42. There was only one reported crash from 2016 to 2020, which was a non-injury crash occurred in 2016, at Daly Street and Rutherford Street intersection. There were no report crashes within the recent four years.

43. The non-injury crash was a rear end/obstruction type.

44. There were no heavy vehicle or vulnerable road users involved.

Bloomfield Terrace

45. There were three reported injury crashes within the 5-year study period. Two of them had cyclists involved and one had heavy vehicle involved.

46. The most prevalent crash type was rear end/obstruction (58%) and the second most prevalent was crossing/turning (37%).

47. Approximately 69% of all reported crashes occurred at intersections.

Cornwall Street

48. There were four reported injury crashes within the study period. There was one pedestrian involved injury crash occurred in 2018 and there were no heavy vehicle involved injury crashes.

49. Approximately 75% of the injury crashes occurred in overcast or dark environment.

50. The most prevalent crash types are rear end/obstruction (47%) and crossing/turning (42%).

51. Approximately 59% of all reported crashes occurred at intersections.

Andrews Avenue

52. There was only no reported crash in the assessed period. The most recent crash was a non-injury crash occurred in 2010.

53. This crash was a rear end/obstruction crash involved a vehicle on Andrews Avenue hitting another manoeuvring vehicle.

54. There were no heavy vehicle or vulnerable road users involved.

Dudley Street

55. There were only two reported crashes in the past 5 years, both were non-injury crashes occurred in the midblock.

56. Both crashes were rear end/obstruction.

57. There were no heavy vehicle or vulnerable road users involved.

Summary of Safety

58. The data obtained from CAS suggests that within the urban area of Hutt City the majority of crashes do not result in injuries, and I consider this to be linked to the generally low speed of vehicles arising from the relatively close spacing of the intersections.

59. Despite the low injury count overall, the frequency of crashes involving pedestrians and cyclists is of concern. There is a generally low level of infrastructure provided for vulnerable users, including pedestrians and cyclists at present. The lack of space between active users and road lanes affords minimal options for segregation and protection.

60. At the SH2 Melling interchange, the traffic signal controlled lights on SH2 have demonstrated a propensity to generate shunt type crashes, where a vehicles crashes into the rear of a stationary vehicle. In addition, there has been one fatal crash involving a turning vehicle at the interchange.

61. I do note that there is a high incidence of crashes where driving with excess alcohol was a factor. Whilst this is not directly connected to the actual road design or operation, the current approach to road safety is to consider a safe system to road design. This means that whilst driver education is a key element, the design of the transport network should minimise the harm that occurs in the event of a crash.

Appendix F – Pedestrian overbridge assessment

Memorandum

24 July 2020

To	David Irwin		
Copy to	Tom Hurdley		
From	Carey Morris	Tel	+64 4 474 8759
Subject	SH2 Pedestrian Overbridge	Job no.	12505727//

1 Background and purpose of memo

The Waka Kotahi NZ Transport Agency (Waka Kotahi), Hutt City Council (HCC) and Greater Wellington Regional Council (GWRC) together with mana whenua representatives (referred to in this memo as the Project Partners) are working collaboratively on a programme to address flood protection issues, transport resilience, accessibility, efficiency and safety issues at the Melling intersection on State Highway 2 (SH2), and urban renewal and regeneration of Lower Hutt's Central Business District (CBD).

This Project, hereafter referred to as RiverLink, includes the relocation of Melling Station approximately 500m south-west of its current location, to provide space for the new Melling-SH2 intersection. The RiverLink project will enhance pedestrian and cycle links from Melling Station to the western hills suburbs of Harbour View and Tirohanga, however the form and location of these links is not finalised.

The Melling Single Stage Business Case (SSBC) included reference to a pedestrian bridge over SH2 connecting to the Hutt River pedestrian bridge, although this was not part of the recommended scheme, and identified that detailed investigation was required. This memo summarises the initial investigations at the SSBC stage, and outlines the further investigations undertaken into a possible new overbridge pedestrian link between Melling Station and the western hills over SH2, including the options considered and the conclusions reached.

2 Summary of Findings

Based on the further investigations described at Section 5.2 of this memo, it is our opinion that the minor benefits achieved by a new pedestrian overbridge over SH2 connecting Melling Station to Harbour View do not warrant the investment required by the Project Partners. Our assessment concludes that approximately 20 households are brought within an 800m catchment of Melling Station as a result of the pedestrian bridge. Other residents further afield in Harbour View are considered unlikely to utilise a new pedestrian bridge, given the steep gradient in the western hills. Given the small catchment and steep gradient achieved by the bridge, compared to the otherwise significant benefits to cycle and pedestrian links at the Melling interchange as a result of the RiverLink project, a pedestrian overbridge connecting Melling Station to Harbour View is not considered to be feasible.

GHD Limited
Level 3 27 Napier Street Freemans Bay Auckland 1011 PO Box 6543 Victoria Street West Auckland 1142 New Zealand
T 64 9 370 8000 **F** 64 9 370 8001 **E** aklmail@ghd.com **W** www.ghd.com

3 Problem Identification

Due to the steep and undulating nature of the topography of the western hill suburbs, the ‘’SH2 Pedestrian Bridge Location Options Assessment’ (Stantec 2017, Appendix I to the SSBC) found that fewer respondents walked to Melling Station from the adjacent hill suburbs than from the valley floor, and that more people drove to the station from the hill suburbs than from the valley floor.

The RiverLink project provides an opportunity for the provision of infrastructure that could incentivise more residents from the western hill suburbs to choose an active mode of transport from their homes to Melling Station, rather than driving a car.

4 Overview of Option

The SSBC identified an opportunity to extend the proposed pedestrian bridge across the Hutt River further across SH2, providing a direct pedestrian link between the relocated Melling Station and Harbour View. The existing and potential pedestrian routes from Harbour View to Melling Station are identified at Figure 1 below.

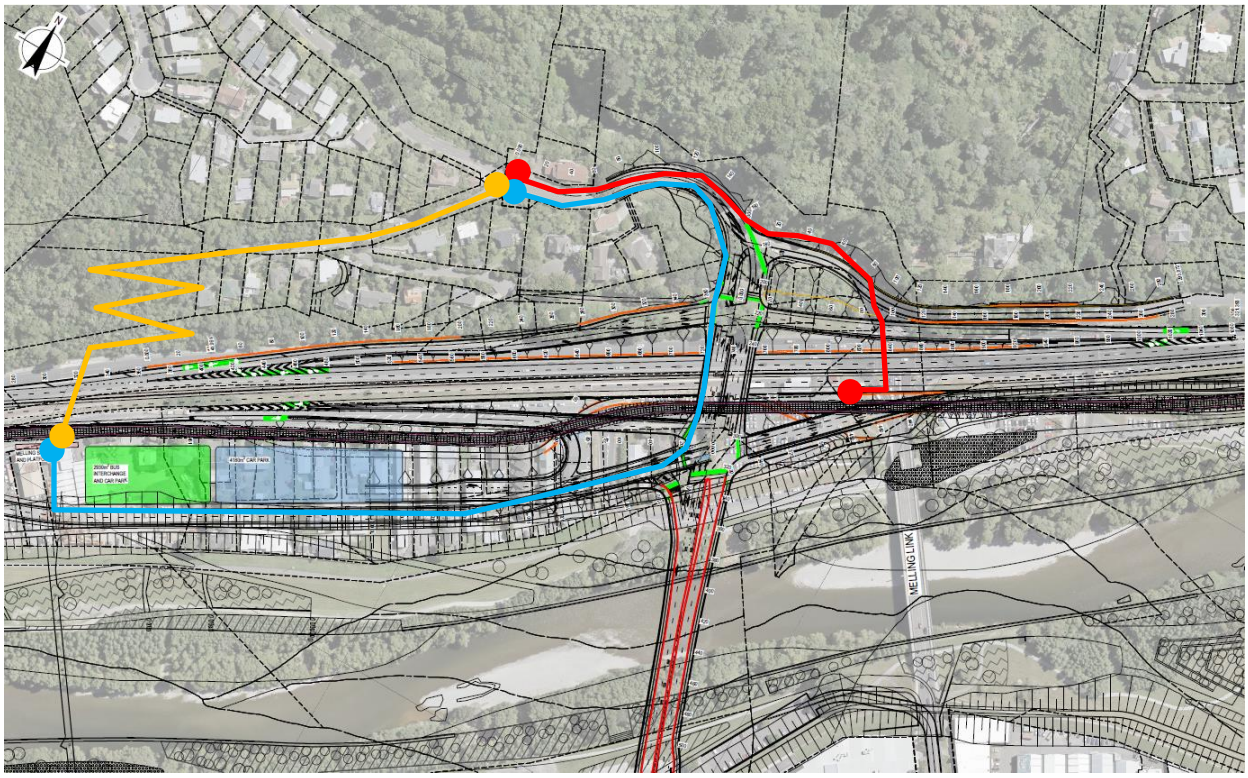


Figure 1 Existing and potential future pedestrian routes

5 Detailed Options

5.1 SSBC SH2 Pedestrian Bridge Location Options Assessment

As part of the SSBC, a brief options assessment report was prepared by Stantec in 2019 for a potential pedestrian overbridge over SH2, connecting the relocated Melling Station to the Western Hill suburb of Harbour View.

This analysis considered five options as outlined in Table 1, and shown at Figure 2.

Table 1 Overbridge options

Option	Description
Existing network	Existing Melling network.
Option 1	Includes new interchange and bridge over Hutt River into Queens Drive (indicated green in Figure 1). Also includes footbridge over Hutt River connecting to Margaret Street (blue in Figure 1).
Option 2	As Option 1, with the addition of a new pedestrian bridge over SH2, connecting into Harbour View at Gaskill Grove (red in Figure 1).
Option 3	As Option 2, with an additional footpath extension added to City View Grove (yellow in Figure 1).
Option 3A	Variation on Option 3, with an alternative connection to City View Grove (dashed yellow in Figure 1).

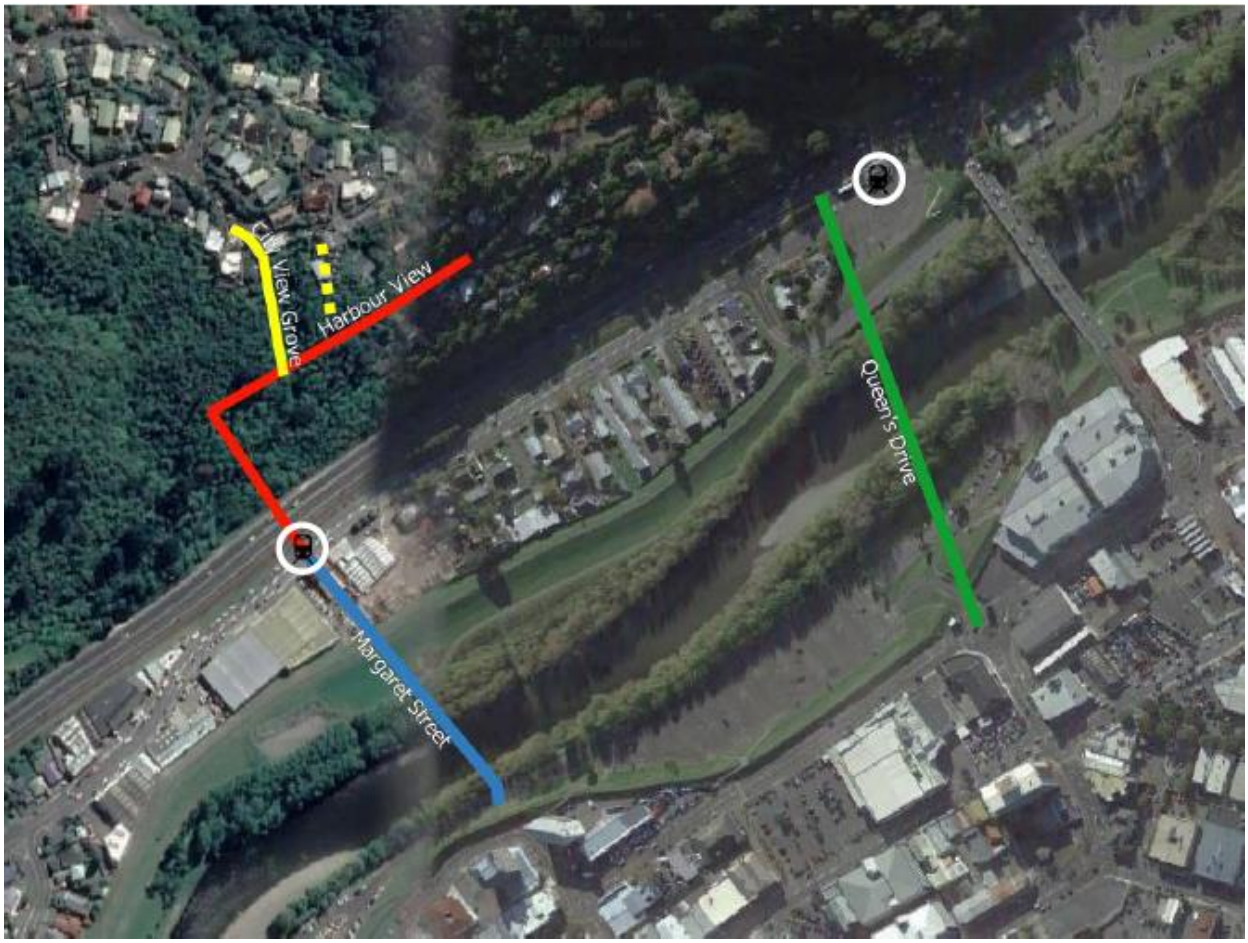


Figure 2 Overbridge options

A walking catchment assessment undertaken found that due to the relocation of Melling Station, all options would increase the walking distance from Harbour View, however Options 2 and 3/3A incorporating a pedestrian bridge over SH2 would result in no change to walking time. It is noted that the pedestrian route to the suburb of Tirohanga is not impacted by a potential SH2 pedestrian overbridge. Residents of Tirohanga will in future use the new Melling interchange to access Melling Station.

The options assessment found that the average gradient for the pedestrian bridge and path was 14% for Option 2, 23% for Option 3, and 24% for Option 3A. Given each option has an average gradient greater than 8%, the feasibility analysis report notes that sections of stairs would be required to achieve the proposed alignment, as per Chapter 14 of the New Zealand Transport Agency's 'Pedestrian and Planning Design Guide'.

Regarding cost, the options assessment estimated the combined property acquisition and construction costs of a pedestrian overbridge at $1.5M for Option 2, $2.3M-$3.6M for Option 3, and $2.5M-$3.1M for Option 3A. This cost included an estimated $0.6M cost saving owing to construction synergies with a highway signage gantry structure.

The options assessment concluded that, based on the overbridge's alignment with the Melling investment objectives, further detailed investigation into the feasibility of providing improved pedestrian connections into Harbour View was recommended.

5.2 Pre-Implementation Options

GHD prepared a sketch design to further understand the gradient required to achieve an overbridge connecting Gaskill Grove to Melling Station. This design achieved a grade of 5.2% for the section above SH2, and 8.3% on the western side of SH2, on the slope connecting to Gaskill Grove. The design incorporated a switchback ramp and is shown at Figure 2. An option incorporating stairs in addition to an accessible ramp was also considered. Stairs could be provided as indicated in red at Figure 2.

Figure 3 GHD overbridge sketch design (red indicates possible stair option)

A walking catchment analysis of the GHD sketch design was undertaken. Given the switchback nature of the ramp design, the distance from the end of Gaskill Grove to the relocated Melling Station is 460m. Therefore, the walking catchment analysis found there would be zero households within 400m of the station, and approximately 20 households within 800m of the station. The stair option has the potential to save approximately 200m in length from the path, however it would likely be a zig-zag arrangement, given that 1200mm landings are required for every 2.5m in elevation. The stairs would collectively achieve 20m of elevation, requiring a total of eight landings.

6 Discussion and conclusion on alternatives process

The options produced by Stantec each require stairs to achieve the proposed grades, and it appears that a separate accessible ramp was not considered or proposed. This design precludes disabled access.

Goal three of the Hutt City Accessibility and Inclusiveness Plan 2017-2027 is that "*All people are able to move about the city easily and safely without being limited by the physical environment*". A design incorporating stairs is also contrary to the New Zealand Disability Strategy 2016-2026, and the UN Convention on the Rights of Persons with Disabilities 2008. A design incorporating stairs and not providing a separate accessible ramp is therefore considered a fatal flaw, and is not further assessed.

GHD's sketch design incorporates a ramp, and therefore provides for disabled access. It also considers a stair option, reducing the length of the path by approximately 200m. However, for the reasons outlined below, it is considered that an overbridge over SH2 from Melling Station to the western hills should not be pursued:

- The GHD sketch design achieves a catchment of zero households within 400m, and approximately 20 households within 800m. It is acknowledged that some residents beyond 800m may choose to walk, however 400m/800m catchments correspond to a 2.5-5 min walk (on flat ground), and are widely agreed standards to determine likely walking catchments. The proportion of residents likely to walk beyond 800m reduces very rapidly, particularly given the steep nature of the topography in the western hills. The catchment achieved by a potential overbridge is therefore extremely small, and is not considered to warrant the investment required to design and construct a pedestrian overbridge.
- The gradient and topography of the area west of SH2 significantly diminishes the feasibility of a pedestrian overbridge. Options 2, 3 and 3A developed by Stantec achieve gradients of 14%, 23% and 24% respectively. GHD's sketch design achieves a maximum gradient of 8.3%, owing to the switchback design. Nonetheless, it is considered that this gradient would reduce the number of residents willing to use the bridge, particularly cyclists. The steep gradient of Harbour View Road itself is indicative of the topography of the area – it reaches an approximate grade of 14% at the intersection with Gaskill Grove.
- Given the location of the bridge, any design would struggle to achieve the principles of crime prevention through environmental design (CPTED). Since the bridge and path would cross through Jubilee Park, passive surveillance from neighbouring residents could not be achieved. The switchback design necessary to achieve the required gradient increases the distance and time of exposure to crime risk.
- The proposed Melling interchange, which will grade separate SH2, will incorporate suitable pedestrian and cycling facilities to allow active mode access from the western hills to Melling Station. Since this interchange is moving further south compared to the existing intersection, the distance required to travel from the western hills to Melling Station will only increase by approximately 200m compared to existing.
- Given the steep topography of the western hills compared to other areas in Lower Hutt, the catchment area in Harbour View is unlikely to significantly intensify in the foreseeable future, therefore any proposed overbridge is not anticipated to see a significant increase in patronage in the medium term.

In summary, while it is recognised that in plan view the provision of a pedestrian overbridge appears to provide reasonable benefits, the topography and geography in this particular location does not result in the same benefits that would be anticipated in other locations. The small catchment of households and the steep gradient of the path required would not result in the patronage uptake necessary to ensure the investment of the Project Partners is suitably viable.

Regards,

Carey Morris
Central Region Manager

Appendix G – Forecast traffic flows

Table 9: 2036 AM period flow changes

Road	2026 Base	2026 Project	Difference
SH2 south of Melling (NB)	1583	2011	428
SH2 south of Melling (SB)	2174	2531	357
SH2 north of Melling (NB)	1335	1337	2
SH2 south of Melling (SB)	2521	2953	432
Pharazyn Street (NB)	185	78	-107
Pharazyn Street (SB)	551	335	-216
Railway Avenue (EB)	913	713	-200
Railway Avenue (WB)	815	760	-55
Marsden Street (NB)	117	25	-92
Marsden Street (SB)	307	163	-144
Melling Bridge (EB)	1781	1481	-300
Melling Bridge (WB)	1618	1495	-123
Rutherford Street adj #11 (NB)	578	535	-43
Rutherford Street adj #11 (SB)	993	714	-279
Rutherford Street adj #41 (NB)	349	733	384
Rutherford Street adj #41 (SB)	860	541	-319
Rutherford Street adj #63 (NB)	271	205	-66
Rutherford Street adj #63(SB)	584	467	-117
Daly Street north (NB)	44	0	-44
Daly Street north (SB)	318	0	-318
Daly Street south (NB)	353	0	-353
Daly Street south (SB)	570	0	-570
Dudley Street (SB)	547	372	-175
High Street adj #423 (NB)	84	113	29
High Street adj #423 (SB)	273	67	-206
High Street adj #339 (NB)	88	125	37
High Street adj #339 (SB)	322	44	-278
High Street adj #261(NB)	168	69	-99
High Street adj #261 (SB)	313	231	-82
High Street adj #181 (NB)	93	29	-64
High Street adj #181 (SB)	130	49	-81

Road	2026 Base	2026 Project	Difference
High Street adj Fraser St (NB)	593	456	-137
High Street adj Fraser St (SB)	795	428	-367
Queens Drive adj #151 (EB)	263	871	608
Queens Drive adj #151 (WB)	259	479	220
Queens Drive adj #134 (EB)	295	646	351
Queens Drive adj #134 (WB)	201	496	295
Queens Drive adj #131 (NB)	121	355	234
Queens Drive adj #131 (SB)	305	751	446
Queens Drive adj #103 (NB)	92	336	244
Queens Drive adj #103 (SB)	136	393	257
Queens Drive adj #77 (NB)	163	288	125
Queens Drive adj #77 (SB)	44	404	360
Queens Drive adj #11 (NB)	746	750	4
Queens Drive adj #11 (SB)	266	897	631
Margaret Street adj #10 (EB)	5	174	169
Margaret Street adj #10 (WB)	10	3	-7
Margaret Street adj #6 (EB)	12	95	83
Margaret Street adj #6 (WB)	5	8	3
Melling Link adj #27 (EB)	674	171	-503
Melling Link adj #27 (WB)	487	66	-421

2036 PM period flow changes

Road	2026 Base	2026 Project	Difference
SH2 south of Melling (NB)	2343	2537	194
SH2 south of Melling (SB)	1872	2092	220
SH2 north of Melling (NB)	2150	2359	209
SH2 south of Melling (SB)	1874	1945	71
Pharazyn Street (NB)	138	233	95
Pharazyn Street (SB)	262	378	116
Railway Avenue (EB)	921	757	-164
Railway Avenue (WB)	1087	957	-130
Marsden Street (NB)	75	138	63
Marsden Street (SB)	153	103	-50
Melling Bridge (EB)	1934	1748	-186
Melling Bridge (WB)	2127	1872	-255

Road	2026 Base	2026 Project	Difference
Rutherford Street adj #11 (NB)	1244	889	-355
Rutherford Street adj #11 (SB)	745	613	-132
Rutherford Street adj #41 (NB)	1351	792	-559
Rutherford Street adj #41 (SB)	642	882	240
Rutherford Street adj #63 (NB)	532	476	-56
Rutherford Street adj #63(SB)	630	527	-103
Daly Street north (NB)	30	0	-30
Daly Street north (SB)	546	0	-546
Daly Street south (NB)	492	0	-492
Daly Street south (SB)	987	0	-987
Dudley Street (SB)	923	625	-298
High Street adj #423 (NB)	359	423	64
High Street adj #423 (SB)	132	116	-16
High Street adj #339 (NB)	189	241	52
High Street adj #339 (SB)	194	155	-39
High Street adj #261(NB)	439	248	-191
High Street adj #261 (SB)	230	171	-59
High Street adj #181 (NB)	123	32	-91
High Street adj #181 (SB)	42	80	38
High Street adj Fraser St (NB)	655	360	-295
High Street adj Fraser St (SB)	1195	950	-245
Queens Drive adj #151 (EB)	275	696	421
Queens Drive adj #151 (WB)	776	1245	469
Queens Drive adj #134 (EB)	262	563	301
Queens Drive adj #134 (WB)	547	1114	567
Queens Drive adj #131 (NB)	572	919	347
Queens Drive adj #131 (SB)	214	845	631
Queens Drive adj #103 (NB)	361	796	435
Queens Drive adj #103 (SB)	287	812	525
Queens Drive adj #77 (NB)	139	366	227
Queens Drive adj #77 (SB)	330	907	577
Queens Drive adj #11 (NB)	746	1021	275
Queens Drive adj #11 (SB)	791	1325	534
Margaret Street adj #10 (EB)	5	165	160
Margaret Street adj #10 (WB)	209	6	-203
Margaret Street adj #6 (EB)	17	92	75

Road	2026 Base	2026 Project	Difference
Margaret Street adj #6 (WB)	5	12	7
Melling Link adj #27 (EB)	558	139	-419
Melling Link adj #27 (WB)	460	69	-391

Appendix H Melling Interchange HRIG Analysis

18 May 202118 May 202118 May 2021

To	Project Document		
Copy to	Duncan Tindall		
From	Angelia Cao	**Tel**	
Subject	Riverlink Melling Interchange High Risk Intersection Analysis	**Project no.**	125/05727125/05727125/05727

Introduction

This memo documents high risk intersection guide and crash risk factors guide assessments of the Melling Interchange intersection. Assessments have been done separately for Melling Interchange North and South intersections and then combined.

Crash History

At the Melling interchange north intersection, there has been a total of 12 injury crashes for the past 5 years, from 2016 to 2020, including three fatal and serious injury crashes.

At the Melling interchange south intersection, there has been a total of eight injury crashes for the past 5 years, including two fatal and serious injury crashes.

High Risk Intersection Guide Assessment

10.2 Melling Interchange North

Table 10 below shows the calculation of all the metrics required to assess the risk profile of the intersection, referring to High Risk Intersection Guide July 2013.

Table 10 – Melling Interchange North High-risk Metric Assessment

Reported collective risk **F&S crashes (5 years – 50m radius)**	12 injury crashes, 3 F&S crashes in the past 5 years, 3 F&S crashes in the past 10 years. As this intersection have three or more F&S crashes in the past 5 years but does not have five or more F&S crashes in the past 10 years, it is insufficient on its own to determine whether this intersection is a high-risk intersection in terms of fatal and serious crashes alone.
Estimated collective risk **DSI equivalents** **(5 years – 50m radius)**	We now determine the estimated collective risk using Table A3-7 (Rural signalised crossroads: death and serious casualty analysis) to determine estimated collective risk.

Primary Crash Type		Number of Injury Crashes	Adjusted DSI Causalities per Injury Crash	Estimated DSI
A	Overtaking and lane change	0	0.22	0
B	Head on	0	0.4	0
C	Lost control or off road (straight roads)	1	0.3	0.3
D	Cornering	0	0.3	0
E	Collision with obstruction	0	0.16	0
F	Read end	5	0.09	0.45
G	Turning versus same direction	0	0.14	0
H	Crossing (no turns)	1	0.27	0.27
J	Crossing (vehicle turning)	1	0.2	0.2
K	Merging	0	0.23	0
L	Right turn against	2	0.18	0.36
M	Manoeuvring	0	0.23	0
N	Pedestrians crossing road	0	0.6	0
P	Pedestrians other	0	0.6	0
Q	Miscellaneous	0	0.5	0
	Motorcyclist	2	0.5	1
	Cyclist			0
	Total Estimated Death & Serious Injuries			**2.58**

2.58 estimated DSI equivalents in 5 years.

Referencing

DSI equivalents in 5 years is above 1.6, Table 4-1 (Criteria for identifying intersection collective risk) indicates that there is a high collective risk. This shows that the F&S crashes number in the past 5 years is similar to the estimated DSI rates.

Collective risk is high.

Estimated personal risk

Using the through route flows of 40,549 and 37,285 vpd for SH2 northbound and southbound south of the intersection and SH2 northbound and southbound north of the intersection respectively; and sideroads, 21,552 and 2,473 for Melling Link and Harbour View Road respectively.

The daily product of flow is calculated by (Section 4.2.2):

$$PoF = \left(average\left(Q_{major_1}, Q_{major_2}\right) \cdot average\left(Q_{minor_1}, Q_{minor_2}\right)\right)^{0.4}$$

PoF = ((40549 + 37285) x 0.5 x (21552 + 2473) x 0.5) $^{0.4}$ = 2937

The personal risk is calculated by (Section 4.2.2):

$$Personal\ risk = \frac{\max(reported\ F\&S\ crashes. 0.5, estimated\ DSI\ equivalents) \cdot 10^8}{\left(average\left(Q_{major_1}, Q_{major_2}\right) \cdot average\left(Q_{minor_1}, Q_{minor_2}\right)\right)^{0.4} \cdot 5\ years \cdot 365\ days \cdot 1.7}$$

Personal risk = $\frac{2.58\ DSIs \times 10^8}{2937 \times 5\ years \times 365\ days \times 1.7}$

= 28

	Referencing As the personal risk value metric is between 16 to 32, Table 4-2 (Personal risk levels and risk metric values) indicates that there is a medium-high personal risk. **Personal risk is medium-high.**
LoSS	To determine Level of Safety Service (LoSS), use Appendix 5 Figure A5-8 (LoSS bands for rural signalised crossroad intersections) which compare actual injury data against typical crash rates for specific intersection types. The product of flow was calculated above as 2937 and the number of report injury crashes in the past 5 years is 12. Using Figure A5-7 **LoSS = IV.** LoSS IV is poor performing – this intersection has a crash rate worse than expected of 70% of all rural signalised crossroad intersections, as defined in table 4-3 (Level of safety service bands).

Hence, at the Melling Interchange North Intersection, according to High Risk Intersection Guide, there is a high collective risk and a median-high personal risk. The Level of Safety Service (LoSS) is IV. Hence, this intersection is considered as a high-risk intersection.

10.3 Melling Interchange South

Table 11 below shows the calculation of all the metrics required to assess the risk profile of the intersection, referring to High Risk Intersection Guide July 2013.

Table 11 – Melling Interchange South High-risk Metric Assessment

Reported collective risk **F&S crashes (5 years – 50m radius)**	8 injury crashes, 2 F&S crashes in the past 5 years, 2 F&S crashes in the past 10 years. As this intersection does not have three or more F&S crashes in the past 5 years and does not have five or more F&S crashes in the past 10 years, that means it is not a high-risk intersection in terms of fatal and serious crashes alone. However, it is insufficient on its own, further analysis see below.
Estimated collective risk **DSI equivalents** **(5 years – 50m radius)**	We now determine the estimated collective risk using Table A3-7 (Rural signalised crossroads: death and serious casualty analysis) to determine estimated collective risk.

Primary Crash Type		Number of Injury Crashes	Adjusted DSI Causalities per Injury Crash	Estimated DSI
A	Overtaking and lane change	0	0.22	0
B	Head on	0	0.4	0
C	Lost control or off road (straight roads)	1	0.3	0.3
D	Cornering	1	0.3	0.3
E	Collision with obstruction	0	0.16	0
F	Read end	3	0.09	0.27
G	Turning versus same direction	0	0.14	0
H	Crossing (no turns)	0	0.27	0
J	Crossing (vehicle turning)	0	0.2	0
K	Merging	0	0.23	0
L	Right turn against	0	0.18	0
M	Manoeuvring	0	0.23	0
N	Pedestrians crossing road	0	0.6	0
P	Pedestrians other	0	0.6	0
Q	Miscellaneous	0	0.5	0
	Motorcyclist	3	0.5	1.5
	Cyclist	0	0	0
	Total Estimated Death & Serious Injuries			**2.37**

2.37 estimated DSI equivalents in 5 years.

Referencing

DSI equivalents in 5 years is above 1.6, Table 4-1 (Criteria for identifying intersection collective risk) indicates that there is a high collective risk. This shows that the F&S crashes number in the past 5 years is similar to the estimated DSI rates.

Collective risk is high.

Estimated personal risk

Using the through route flows of 40,549 and 37,285 vpd for SH2 northbound and southbound south of the intersection and SH2 northbound and southbound north of the intersection respectively; and sideroads, 4,717 and 1,213 for Block Road and Tirohanga Road respectively.

The daily product of flow is calculated by (Section 4.2.2):

$$PoF = \left(average\left(Q_{major_1}, Q_{major_2}\right) \cdot average\left(Q_{minor_1}, Q_{minor_2}\right)\right)^{0.4}$$

PoF = ((40549 + 37285) x 0.5 x (4717 + 1213) x 0.5) $^{0.4}$ = 1678

The personal risk is calculated by (Section 4.2.2):

$$Personal\ risk = \frac{\max(reported\ F\&S\ crashes.0.5, estimated\ DSI\ equivalents) \cdot 10^8}{\left(average\left(Q_{major_1}, Q_{major_2}\right) \cdot average\left(Q_{minor_1}, Q_{minor_2}\right)\right)^{0.4} \cdot 5\ years \cdot 365\ days \cdot 1{,}7}$$

Personal risk = $\frac{2.37\ DSIs \times 10^8}{1678 \times 5\ years \times 365\ days \times 1.7}$

= 46

	Referencing As the personal risk value metric is above 32, Table 4-2 (Personal risk levels and risk metric values) indicates that there is a high personal risk. **Personal risk is high.**
LoSS	To determine Level of Safety Service (LoSS), use Appendix 5 Figure A5-8 (LoSS bands for rural signalised crossroad intersections) which compare actual injury data against typical crash rates for specific intersection types. The product of flow was calculated above as 2937 and the number of report injury crashes in the past 5 years is 8. Using Figure A5-7 **LoSS = IV.** LoSS IV is poor performing – this intersection has a crash rate worse than expected of 70% of all rural signalised crossroad intersections, as defined in table 4-3 (Level of safety service bands).

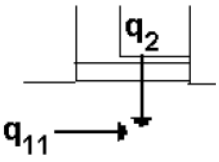
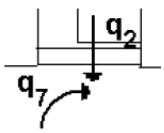
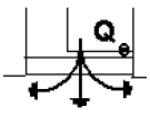
Hence, at the Melling Interchange South Intersection, according to High Risk Intersection Guide, there is a high collective risk and a high personal risk. The Level of Safety Service (LoSS) is IV. Hence, this intersection is considered as a high-risk intersection.

Crash Risk Factors Guide Assessment

10.4 Melling Interchange North

Table 12 below shows the calculation of typical crash rate A_T required to assess the crash risk factors of the intersection, referring to Crash Risk Factors Guidelines Compendium, Table 23 (Urban signalised cross roads (<80km/h) variables and CAS movement categories).

Table 12 – Melling Interchange North Crash Risk Factors Assessment

Crash Type	Variables	Volume & Typical Crash Rate A_T
Crossing (no turns, motor vehicle only)	$q_{2/11}$ = Through vehicle flows in veh/day 	Not Applicable
Right turn against (motor vehicle only)	 q2 = Through vehicle flow in veh/day q7 = Right-turning vehicle flow in veh/day	q2 = 1,634 q7 = 6,280 Typical Crash Rate (predicted injuries) A_T **A_T = 0.08**
Others (motor vehicle only)	 Qe = Entering vehicle flow in veh/day	Qe = 8,691 & Qe = 1,690 & Qe = 7,682 Typical Crash Rate (predicted injuries) A_T

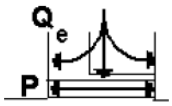
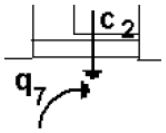
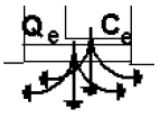
Crash Type	Variables	Volume & Typical Crash Rate A_T
		A_T = 0.04 & **A_T = 0.02 &** **A_T = 0.04**
Pedestrian versus motor vehicle	 Qe = Entering vehicle flow in veh/day P = Pedestrian crossing volume in ped/day	Not Applicable
Right turn against (cyclist travelling through)	 q7 = Right-turning vehicle flow in veh/day c2 = Through cycle flow in cyc/day	Not Applicable
Others (cyclist versus motor vehicle)	 Qe = Entering vehicle flow in veh/day Ce = Entering cycle flow in cyc/day	Not Applicable
Melling North Injury Crashes Per Year A_T (SUM of all A_T)		**0.19**

Table 13 shows the calculation of estimated injury crashes per year and per 5 years at the Melling Interchange North intersection, referring to Crash Risk Factors Guidelines Compendium.

Table 13 – Melling Interchange North Estimated Injury Crashes per Year and per 5 Years

Item	Value
Future Year	2036
A = A_T * (1+(-0.01)*(2036-2006)	
Melling North	
Current Year Melling North Injury Crashes per Year A_T	0.19 (from Table 12)
Future Year Estimated Injury Crashes per Year	0.13 (from formula above)
Crash Modification Factor (CMF)	1 (no adjustment applied)
Estimated Injury Crashes per Year	0.13
Estimated Injury Crashes per 5 Years	0.65

Hence, with the traffic volume in 2036, it is estimated that in year 2036, there will be 0.13 injury crashes per year and 0.65 injury crashes per five years at this intersection.

10.5 Melling Interchange South

Table 14 below shows the calculation of typical crash rate A_T required to assess the crash risk factors of the intersection, referring to Crash Risk Factors Guidelines Compendium, Table 23 (Urban signalised cross roads (<80km/h) variables and CAS movement categories).

Table 14 – Melling Interchange South Crash Risk Factors Assessment

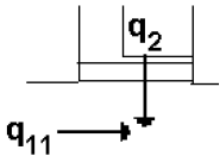
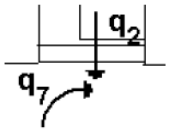
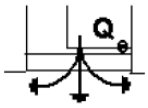
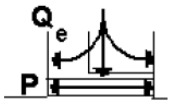
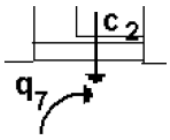
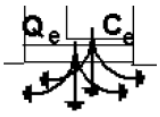
Crash Type	Variables	Volume & Typical Crash Rate A_T
Crossing (no turns, motor vehicle only)	$q_{2/11}$ = Through vehicle flows in veh/day 	q2 = 9,186 q11 = 1,622 & q2 = 5,733 q11 = 1,622 Typical Crash Rate (predicted injuries) A_T **A_T = 0.04 &** **A_T = 0.03**
Right turn against (motor vehicle only)	 q2 = Through vehicle flow in veh/day q7 = Right-turning vehicle flow in veh/day	q2 = 1,622 q7 = 336 Typical Crash Rate (predicted injuries) A_T **A_T = 0.02**
Others (motor vehicle only)	 Qe = Entering vehicle flow in veh/day	Qe = 45 & Qe = 1,690 & Qe = 11,683 & Qe = 9,831 & Qe = 6,626 Typical Crash Rate (predicted injuries) A_T **A_T = 0.01 &** **A_T = 0.02 &** **A_T = 0.05 &** **A_T = 0.05 &** **A_T = 0.04**
Pedestrian versus motor vehicle	 Qe = Entering vehicle flow in veh/day P = Pedestrian crossing volume in ped/day	Not Applicable
Right turn against (cyclist travelling through)	 q7 = Right-turning vehicle flow in veh/day c2 = Through cycle flow in cyc/day	Not Applicable
Others (cyclist versus motor vehicle)	 Qe = Entering vehicle flow in veh/day Ce = Entering cycle flow in cyc/day	Not Applicable
Melling North Injury Crashes Per Year A_T (SUM of all A_T)		**0.26**

Table 15 shows the calculation of estimated injury crashes per year and per 5 years at the Melling Interchange North intersection, referring to Crash Risk Factors Guidelines Compendium.

Table 15 – Melling Interchange South Estimated Injury Crashes per Year and per 5 Years

Item	Value
Future Year	2036
$A = A_T * (1+(-0.01)*(2036-2006)$	
Melling North	
Current Year Melling South Injury Crashes per Year A_T	0.26 (from Table 14)
Future Year Estimated Injury Crashes per Year	0.18 (from formula above)
Crash Modification Factor (CMF)	1 (no adjustment applied)
Estimated Injury Crashes per Year	0.18
Estimated Injury Crashes per 5 Years	0.90

Hence, with the traffic volume in 2036, it is estimated that in year 2036, there will be 0.18 injury crashes per year and 0.90 injury crashes per five years at this intersection.

10.6 Melling Interchange Intersection Risk Factor Summary

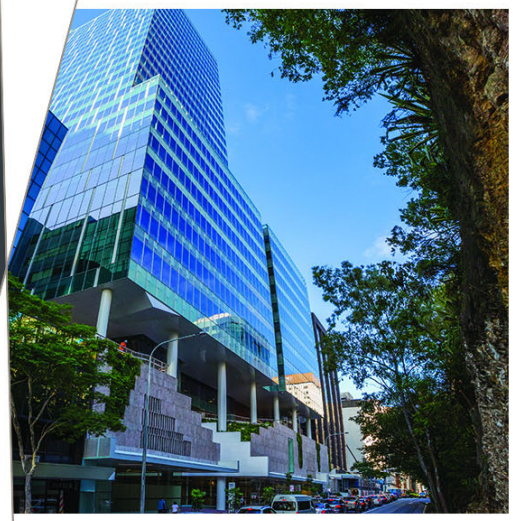
Collectively, in year 2036, at the Melling Interchange intersection, with the traffic volume in 2036, it is estimated that there will be 0.31 injury crashes per year and 1.56 injury crashes per five years.

Appendix I Hutt Parking Report 2020

Hutt Parking Report

February 2021

NZ0120130



Prepared for
Hutt City Council

19 February 2021

Cardno

About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

Table of Contents

1 Introduction

1.1 Background

A series of parking studies were undertaken in Lower Hutt and Petone in June 2017. These surveys were used to assist in the preparation of the Hutt City Parking Policy.

The primary purpose of 2020 surveys is to undertake occupancy surveys to determine which areas have parking occupancy utilisation rates above 85 percent as this is considered to be the level at which the level of service for parking deteriorates.

The purpose of this report is to update the 2017 parking surveys, particularly occupancy, to enable Hutt City Council (Council) to make decisions on parking restrictions and policy.

1.2 Scope and Limitations

This report has been prepared by Cardno NZ for Hutt City Council. Cardno NZ otherwise disclaims responsibility to any person other than Hutt City Council arising in conjunction with this report.

The services provided by Cardno NZ in conjunction with preparing this report were limited to those specifically detailed in the report and are subject to the scope to the report limitations set out in this report.

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favouring by the United States Government or any agency thereof or its contractors or subcontractors.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information supplied and reviewed at the date of preparation of the report. Cardno NZ has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

1.3 Methodology

Traditionally parking surveys are undertaken using surveyors who walk around the streets recording either occupied spaces or vehicle licence plates for turnover surveys. Such surveys are time consuming to gather and also analyse.

To undertake these parking surveys, video footage was used to capture the data at greater speed, and extract data from the video footage post survey. This also enables a record to be kept of the data on a particular day.

To undertake the surveys, each street was driven in a particular route (beat) at regular intervals. A video camera on the vehicle recorded the footage and later analysed.

Vehicle number plate recognition software is used to extract the number plates of vehicles at each pre-set location within the beat. These are matched later to get approximate duration of stay of vehicles, or to note whether the vehicle has moved during the day. The more frequent the beat, the more precision in the duration of stay. For this survey, each beat was undertaken hourly between 10:00 and 18:00 with the last record being around 19:00.

Hourly beats provide a good balance between precision and cost. Undertaking hourly beats will enable a distinction to be made between long and short term parking demands.

For the purposes of the parking policy document, it is not considered that the exact duration of stay will be required, which will require beats of 5 minutes and best undertaken on foot.

It should be noted that number plates can not be read if the vehicles are parked hard up against each other. Observations show that this occurs on the residential parking areas where there are no parking spaces marked and vehicles are trying to squeeze between driveways. Based on the data collected, eight percent of number plates on the residential streets could not be extracted and one percent of the number plates on Jackson Street could not be extracted.

1.4 Other Information

The following information was provided by Hutt City Council

- Results from the 2017 surveys
- Historic Parking Revenue Data

2 Parking Variation

Council has provided parking revenue data on a daily basis from 1 January 2016 to 31 August 2020. This data has been used to review daily variation, seasonal variation and any impacts post COVID. It should be noted that in 2016 Council undertook a parking trial with the first hour free. This effected the parking revenue. While revenue will not exactly match occupancy rates in the city, it will provide an indication. Revenue data is only collected for the Hutt CBD and parking in Petone is free. The Hutt CBD also has late night shopping on a Thursday. Despite the late night shopping, most parking in the CBD is free after 17:00[1]. On street parking is free on a Saturday.

Figure 1 shows the parking trends since 1 May 2017. The data has been indexed so that the maximum value is one and all other values are a ratio of the maximum. Weekends are shown with a zero. The data shows peaks in late December associated with Christmas and lows in early January associated with holiday periods. The effects of COVID can be seen during May and April 2020 with a significant reduction in parking. The data also shows that daily variation is significant and greater than seasonal variation, excluding the December/January period.

Figure 1 Daily Weekday Parking Trends

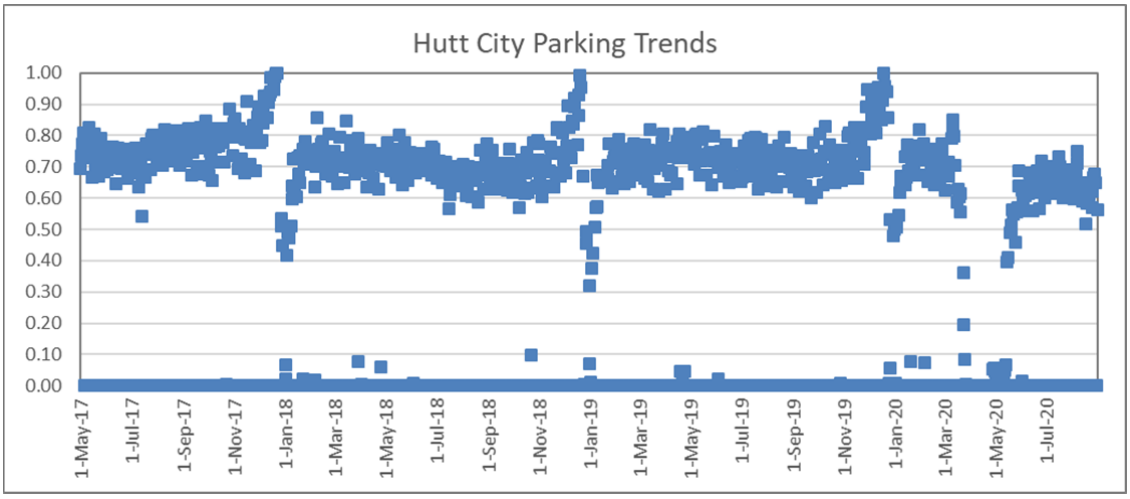


Figure 2 shows the average weekday parking revenue, indexed, for 2019 (red) and 2020 (blue). This removes the daily variation apparent in Figure 1. Public holidays have been removed for clarity. The 2019 school terms are shown by the grey shaded areas.

The 2019 data shows that during the winter months, the parking revenue is lower than during the summer months, excluding the late December and January. There is a slight increase in parking revenue during the July school holidays.

The 2020 data shows that pre COVID, the parking revenue was similar to 2019. However, during COVID there was a significant decrease as businesses and retailers were closed. This is to be expected. As the alert levels reduced, parking revenue increased, however during Level 1 (9 June to 12 August) revenue was still 9 percent less than 2019. As more people are working from home, it is not known if this trend will continue, but needs to be considered when reviewing the results of the survey.

[1] http://www.huttcity.govt.nz/Services/Roads-and-parking/Parking/how-does-parking-work/

Figure 2 Average Weekday Parking Trends

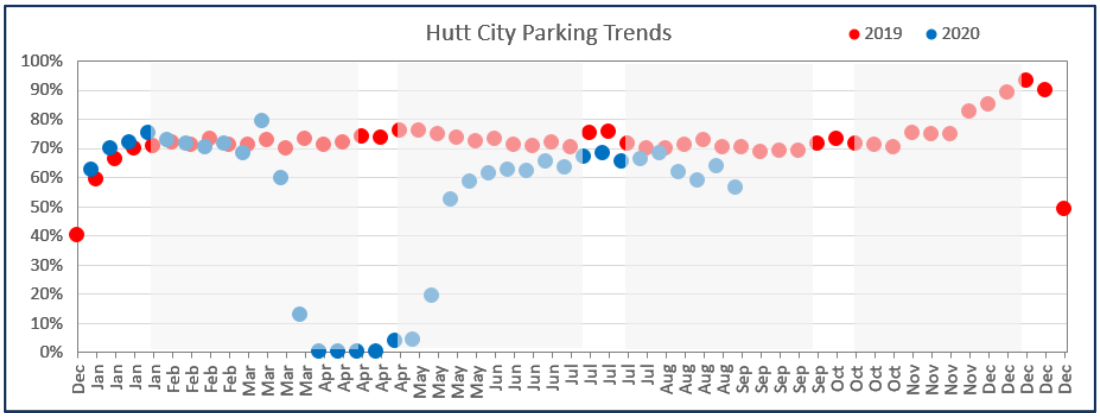


Figure 3 shows the weekly revenue for 2019 ranked in order of highest to lowest. Eighty percent of the weekly revenue is between 74 and 82 percent of the peak revenue, a range of only 8 percent. The week represented by the first week in November is shown with a blue dot.

Figure 3 Ranked Weekday Parking Demands

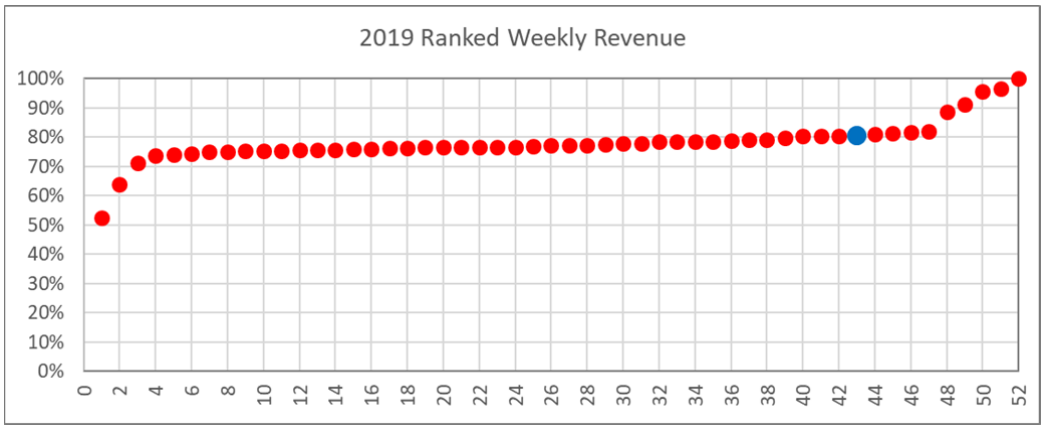
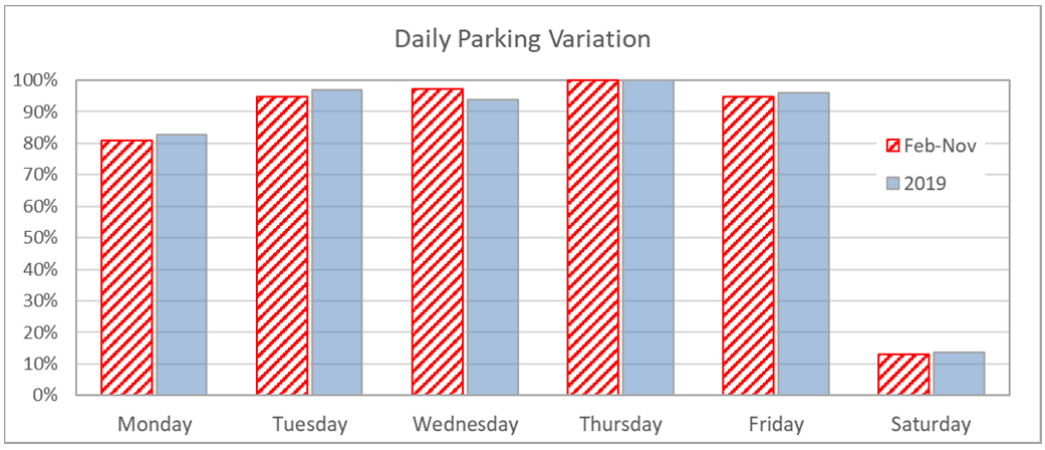


Figure 4 shows the 2019 daily variation in parking revenue for both the average of the whole year and the average for February to November, inclusive. Again the revenue is shown as a percentage of the peak. Between February and November, Thursday has the highest revenue with Tuesday, Wednesday and Friday having 95, 97 and 95 percent of the Thursday revenue. Monday is lower with only 81 percent of the Thursday revenue. Wednesday parking revenue is the closest to the Tuesday to Thursday average.

Figure 4 Daily Variation

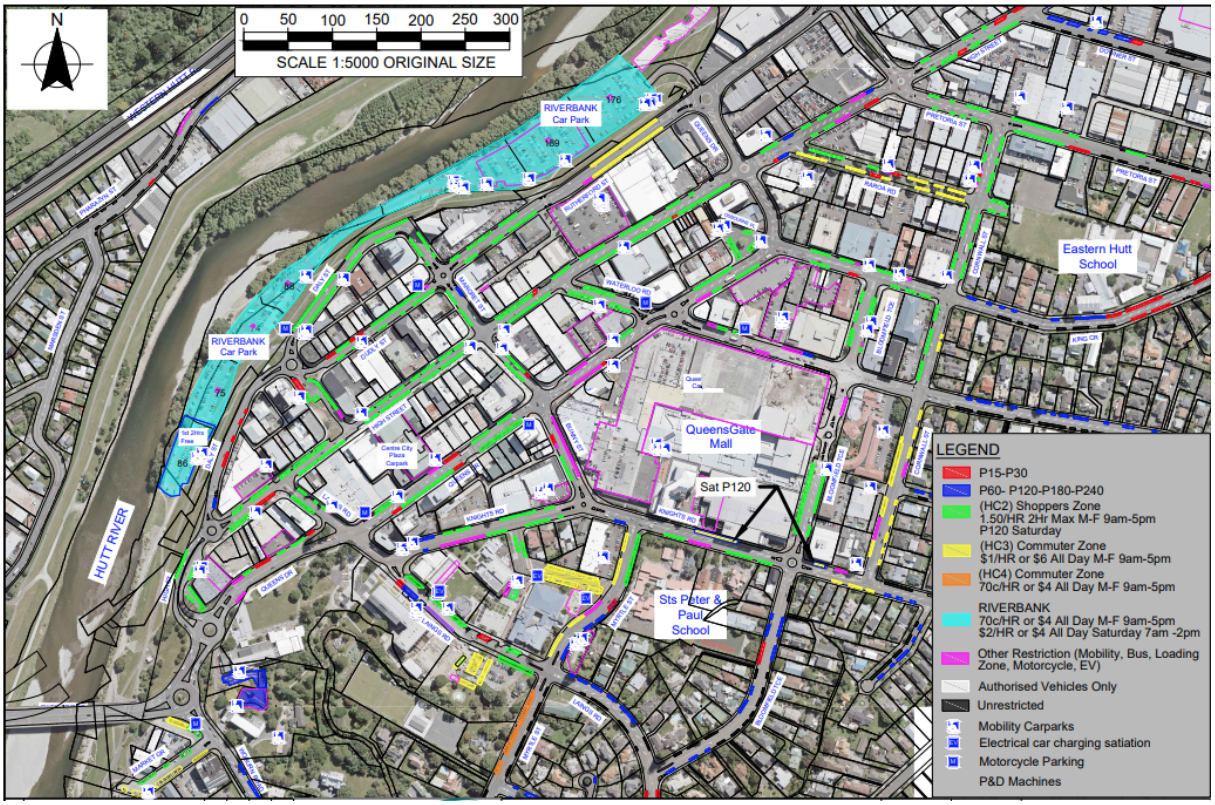


3 Existing Parking Restrictions

3.1 Lower Hutt

The existing on street parking restrictions in central Lower Hutt have been extracted from the Hutt City Council web site[2] and are provided in Figure 5.

Figure 5 Central Lower Hutt Parking Restrictions



The majority of central Lower Hutt parking requires payment from either parking meters or pay and display.

3.2 Petone

Parking throughout Petone is free. However, there are time restrictions on Jackson Street, generally P60 (1 hour) and also in the public off street carparks. Details are provided below:

Peel Car Park

This carpark is adjacent to the Petone Community Library and Heritage Centre. It has vehicle access to both Richmond Street and Britannia Street. The time limit on this carpark is P240 (i.e. four hours) between 9:00 to 18:00 Monday to Friday.

[2] http://iportal.huttcity.govt.nz/Record/ReadOnly?Tab=3&Uri=5050447

Council / Library

There is a small amount of off street parking available to the public adjacent to the Council Service centre on Britannia Street. The time limit is P30 (i.e. half an hour). There are no restrictions on the blue parking signs, which mean they apply between 8:00 and 18:00 except public holidays.

Silbery Place Car Park

This carpark is behind the Petone Community House and has vehicle access to Elizabeth Street. The time limit on this carpark is P120 (i.e. two hours) between 9:00 to 18:00 Monday to Friday.

Beach Street Car Park

This carpark is opposite the Lighthouse picture theatre in Beach Street. The time limit on this carpark is P180 (i.e. three hours) between 9:00 to 18:00 Monday to Friday.

There are generally no parking restrictions in the residential and commercial streets in Petone, other than Jackson Street.

4 Weather Conditions

The survey scheduled for Wednesday 11 November 2020 in Petone was postponed due to the weather forecast, and was undertaken on Thursday 12 November 2020.

The temperature and rainfall for the surveys days are provided below[3]:

Table 1 Weather Conditions During Surveys

Date	Survey Location	Wind	Temp		Rain
Saturday 31 October	Lower Hutt	119 NW	16.5	13.5	2.6 mm
Wednesday 4 November	Lower Hutt	70 NW	20.9	15.7	1.0 mm
Saturday 7 November	Petone	56 NW	17.2	12.0	2.0 mm
Thursday 12 November	Petone	44 NE	17.3	6.6	0.0 mm

Historical Data is provided below for comparison.

Table 2 2019 Weather Conditions

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High	24.4	24.5	24.1	19.6	18.0	16.2	16.7	15.8	15.6	18.4	24.0	22.4
Low	9.3	9.7	6.7	6.5	3.4	3.1	3.6	1.9	2.5	2.7	6.8	8.5
Rain	0.8	1.5	3.9	0.7	4.4	6.6	1.9	1.3	6.5	3.3	3.5	4.3

The temperatures during the survey days was lower than a typical November and this may result in lower parking occupancies.

[3] https://www.metservice.com/towns-cities/locations/wellington/past-weather

5 Lower Hutt Occupancy

Parking occupancy surveys were undertaken for the Hutt CBD for all on street carparks within the area bounded by Laings Road, Cornwall Street, Kings Crescent, Brunswick Street and the Hutt River. The riverbank carpark was also surveyed, excluding the area leased by Harvey Norman. The capacity of the areas was based on the 2017 survey results and updated to reflect changes since then, and google maps. It should be noted that the capacity will vary in areas where individual parking spaces are not marked as drivers may park less efficiently on different days. It has been assumed that 250 spaces in the Riverbank carpark is used by the Saturday market[4].

The surveys were undertaken between 10:00 and 19:00 on Wednesday 4 November 2020 and Saturday 31 October 2020. The Wednesday survey represents the 82th percentile week of the year based on revenue data for 2019.

Appendix A has the detailed results from the Lower Hutt occupancy surveys. The data includes the maximum occupancy levels throughout the day, the average occupancy levels throughout the day, and the average occupancy level for the four-hour period 11:00 to 15:00. The occupancies above 85 percent have been highlighted red.

A summary of the occupancy levels for different areas is provided below.

Table 3 Lower Hutt Occupancy Level Summary

	Wednesday Occupancy			Saturday Occupancy		
Location	Max	Ave.	11 – 15	Max	Ave.	11 – 15
Riverbank Carpark	80%	67%	79%	82%	39%	61%
Daly/Dudly/Rutherford	75%	65%	72%	97%	54%	62%
High/Queen/Margaret/Bunny/Andrew	84%	75%	79%	96%	81%	92%
Laings/Knights/Myrtle/Bloomfield	88%	71%	86%	89%	84%	86%
Cornwall/Waterloo	85%	74%	82%	84%	71%	80%
Raroa/Pretoria/Downer/Bristol/Kings	91%	78%	86%	65%	54%	58%
Total Lower Hutt On Street	84%	74%	82%	81%	68%	75%
Total Lower Hutt	82%	71%	81%	79%	60%	71%

Appendix B has graphs from the Lower Hutt occupancy surveys for individual streets and areas.

[4] 601 available spaces - https://www.stuff.co.nz/national/113894479/lower-hutts-popular-saturday-market-to-stay-at-riverbank-for-now

6 Lower Hutt Duration of Stay

Duration of stay surveys were not undertaken in 2020, however they were in 2017. The average duration of stay in the 2017 surveys were not reported, so have been included in this report based on the data that was received.

Parking beat surveys were undertaken in central Lower Hutt at five locations, where number plates were recorded every five minutes. This enables the duration of stay to be estimated to the nearest 5 minutes for each vehicle. The data provided showed how many observations were made of each vehicle, however if a vehicle had more than 20 observations, they were grouped in a "20+" category (excluding the riverbank carpark on a weekday and Rutherford on a Saturday). An average duration of stay has been assumed as 115 minutes for these vehicles.

The resulting duration of stay for a Tuesday and a Saturday in July 2017 are tabulated below.

Table 4 Lower Hutt Duration of Stay Surveys (minutes), 2017

Location		Time Limit	Tuesday	Saturday
Queens Drive	Arcade to Margaret Street	P120	26.7	32.8
High Street	Arcade to Margaret Street	P120		25.4
Waterloo Road	Queens Drive to Bloomfield Terrace	P120	28.0	38.6
Rutherford Street	Countdown to Queens Drive	P120	29.0	115.2
Riverbank Carpark	South of Andrews Avenue	All Day	197.7	14.9

The percentage of vehicles parked over the posted time restriction within is provided below:

Table 5 Proportion of Illegal Parking, Lower Hutt, 2017

Location		Time Limit	Tuesday	Saturday
Queens Drive	Arcade to Margaret Street	P120	4%	4%
High Street	Arcade to Margaret Street	P120	-	5%
Waterloo Road	Queens Drive to Bloomfield Terrace	P120	9%	13%
Rutherford Street	Countdown to Queens Drive	P120	18%	47%

Given that the reporting varied between the Riverbank and Rutherford survey areas for weekdays and weekends, it is considered that the data provided may be in error and interpretation of the data in Table 4 and Table 5 should be undertaken with care.

7 Petone Occupancy

Parking occupancy surveys were undertaken in Petone for the majority of streets between The Esplanade, Cuba Street, Udy Street and the Hutt Road. Five Council owned carparks were also surveyed. The areas covered are shown in Figure 6.

Figure 6 Petone Parking Survey Locations

For grouping data, the on street areas have been separated into Jackson Street, The Esplanade, western Petone and central Petone, with the latter two being west and east of Nelson Street. Western Petone tends to be commercial Streets wile central Petone tends to be residential streets. Streets east of Cuba Street were not surveyed.

The surveys were undertaken between 10:00 and 19:00 on Thursday 12 November 2020 and Saturday 7 November 2020. These days represent the 80th percentile week of the year based on revenue data for 2019.

Appendix C has the detailed results from the Petone occupancy surveys. A summary of the occupancy levels for different areas is provided below.

Table 6 Petone Occupancy Level Summary

	Wednesday Occupancy			Saturday Occupancy		
Location	Max	Ave.	11 – 15	Max	Ave.	11 – 15
Jackson Street	92%	80%	84%	91%	81%	82%
The Esplanade	103%	60%	65%	42%	30%	32%
Western Petone (commercial)	74%	59%	66%	53%	38%	40%
Central Petone (Residential)	67%	57%	59%	64%	53%	54%
Public Off Street Carparks	87%	58%	64%	91%	75%	85%
Total on Street	73%	61%	65%	63%	51%	52%
Total Petone	73%	60%	65%	64%	52%	54%

Appendix D has graphs from the Lower Hutt occupancy surveys for individual streets and areas.

Some other one-off occupancy surveys were undertaken during 2020. The detailed results from the one-off occupancy surveys are provided in Appendix E.

8 Petone Duration of Stay

The approximate duration of stay can be determined from the number plate recognition, and the number of times a vehicle has been seen in a carpark. As the routes were covered hourly, a single observation could mean that a vehicle was parked for any duration between 5 minutes and 115 minutes, similarly, a vehicle that was observed 3 times, could be parked between 125 and 175 minutes.

The number of hourly observations, for each area is provided in Appendix F.

It is not known how long vehicles have been in the carpark at the start of the survey, nor how long they will stay at the end of the survey, therefore average duration of stay can only be reasonably estimated for vehicles that arrived and departed during the survey itself. However that could reduce the overall average length of stay.

In order to estimate the average duration of stay for vehicles, the following assumptions have been made:

- A vehicle that was observed once has an average duration of stay of 60 minutes (being the average of 5 and 115 minutes)
- A vehicle that was observed twice has an average duration of stay of 120 minutes (being the average of 65 and 175 minutes), etc
- A vehicle that was observed at the start of the survey is assumed to have been in the carpark for an average of 45 minutes prior to the survey commencing
- A vehicle that was observed at the start of the survey is assumed to be staying in the carpark for an average of 30 minutes after the survey finishes

In addition to the number of observations each vehicle had, Appendix F provides an approximate average duration of stay per area.

Table 7 and Table 8 provides a summary of the average duration of stay per area. The percentage of observations that were present at the start of the survey (10:00), the end of the survey (16:45) and parked illegally during the survey are also provided.

Table 7 Petone Weekday Duration of Stay

Location	Time Limit	Average Duration of Stay (minutes)				Percent of Observations	
		At Start	Middle	At End	Average	At Start	At End
Jackson Street	P60	152	67	109	91	18%	21%
The Esplanade	-	265	85	118	161	38%	23%
Western Petone	-	250	77	189	172	43%	18%
Central Petone	-	237	84	181	171	38%	31%
Public Off Street		295	160	173	166	9%	12%
Total		232	84	163	151	32%	24%

Table 8 Petone Saturday Duration of Stay

Location	Time Limit	Average Duration of Stay (minutes)				Percent of Observations	
		At Start	Middle	At End	Average	At Start	At End
Jackson Street	P60	150	75	154	104	20%	18%
The Esplanade	-	163	83	185	120	28%	15%
Western Petone	-	209	72	217	126	22%	16%
Central Petone	-	215	84	210	169	36%	29%
Public Off Street		216	123	176	158	27%	18%
Total		202	81	199	143	29%	23%

It should be noted that the off street carparks were surveyed on a 30 minute beat on the weekday, therefore the data in Table 7 is more accurate for the off street carparks than the on street locations. A 60 minute beat was used on the Saturday (Table 8).

Appendix G provides summary cumulative frequency graphs for the number of times a vehicle was observed during the Petone surveys. The x axis shows the number of observations while the y axis shows the cumulative proportion of vehicles that were observed or less.

9 Jackson Street Vehicle Displacement

There is a perception that retailers on Jackson Street park their vehicles all day on Jackson Street which has a P120 parking restriction, and that the vehicle owners relocate them. The data collection has been used to estimate the quantity of this.

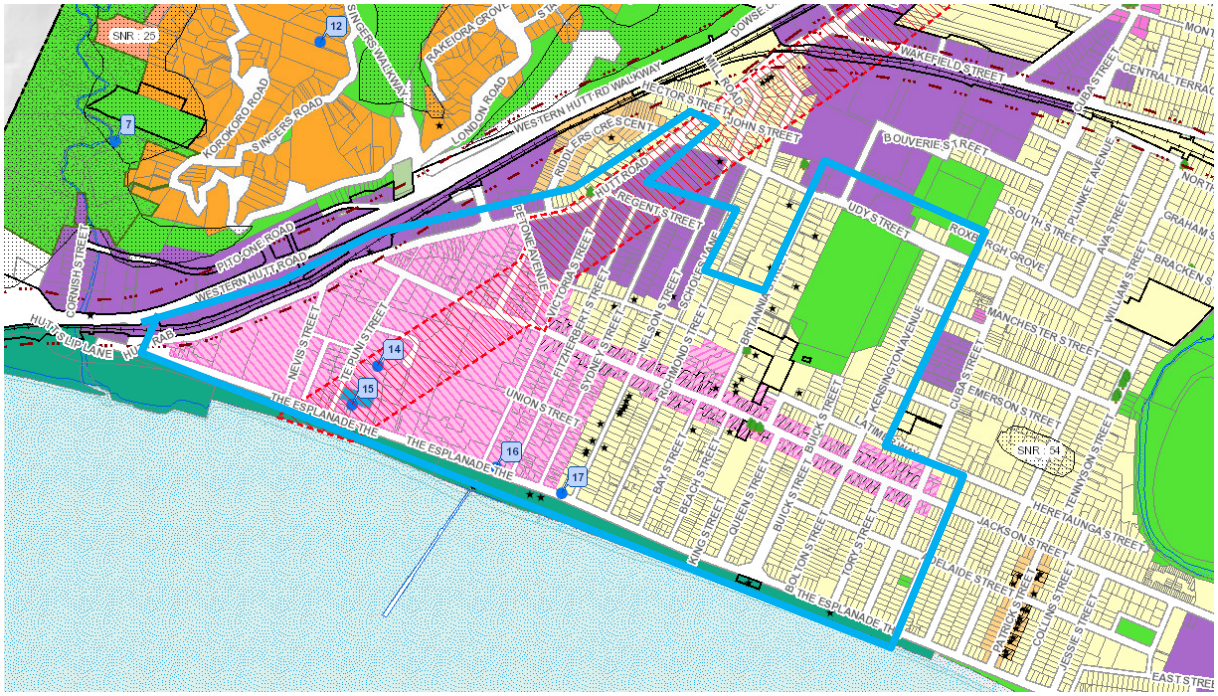
The total number of individual vehicles observed in Petone during the surveys was 11527 on the Wednesday and 9685 on the Saturday. Of these, 983 and 576 were observed to be in different “zones” respectively, that is they moved from on area on Jackson Street to another, or to a residential street.

Details of the vehicles that have moved are provided in Appendix H.

10 Non-residential activity in Residential Streets

The Hutt City District Plan maps for Petone are provided in Figure 7.

Figure 7 Petone Land Use Zoning



The pale yellow areas in Figure 7 are General Residential areas, with pink being Petone Commercial and purple General Business. The area covered by the surveys is shown by the blue border.

As can be seen, a significant part of the survey area is covered by residential streets.

In order to estimate the number of non residential vehicles in the residential streets, a run was undertaken at 5:30 on a weekday. It has been assumed that vehicles observed at 5:30 belong to residents. Occupied spaces during the day were compared to vehicles that were observed at 5:30.

Appendix I provides the total number of residential vehicles parked in each residential street during the day. The percentage of vehicles in each street that are considered to be residential (ie were observed at 5:30 on a weekday), is also provided. This data needs to be read carefully as the percentage is not the percent occupied, but the percent of occupied vehicles that are likely to be residents. If this number is 30 percent, it means that 70 percent of the vehicles belong to owners that do not live in that street. For example, it could be employees, or it could be visitors to commercial activities.

A summary of the proportion of residents on residential streets, excluding Brittannia, Kenington and Cuba Streets (zone 19 to 24, 27 to 35, 38 to 39) is provided in Table 9.

Table 9 Proportion of Residents on Residential Streets

	Wednesday Occupancy			Saturday Occupancy		
Location	Max	Ave.	11 – 16	Max	Ave.	11 – 15
Central Petone (Residential)	30%	22%	19%	19%	15%	14%

11 Summary

Parking occupancy and parking duration of stay surveys were undertaken in central Lower Hutt and Petone in November 2020. The surveys were undertaken during Level One of the COVID pandemic, and a comparison against 2019 revenue data suggests that parking demands may be 9 percent lower as a result.

The surveys were undertaken on weeks that represent the 82th and 80th percentile weeks.

Table 3 provides the occupancy levels observed during the central Lower Hutt surveys. These show that the average occupancy in central Lower Hutt was 71 percent on Wednesday 4 November 2020 and 60 percent on Saturday 31 October 2020. The maximum occupancy levels throughout the day for the entire area was 82 percent and 79 percent respectively. Individual areas had parking occupancy levels higher, with many areas having average occupancy levels above 85 percent for several hours of the day. Details of these can be found in Appendix A.

Table 6 provides the occupancy levels observed during the Petone surveys. These show that the average occupancy in Petone was 60 percent on Thursday 12 November 2020 and 52 percent on Saturday 7 November 2020. The maximum occupancy levels throughout the day for the entire area was 73 percent and 64 percent respectively. Individual areas had parking occupancy levels higher, with many areas having average occupancy levels above 85 percent for several hours of the day. Details of these can be found in Appendix C.

Table 7 and Table 8 provides the average duration of stay by zone for Petone on Thursday and Saturday respectively. Details of individual blocks can be found in Appendix F.

Analysis was undertaken to determine if any vehicles in Petone, particularly on Jackson Street, relocated within the survey period. The analysis showed that 97 and 34 vehicles relocated within Jackson Street on a weekday and Saturday respectively. Details of these can be found in Appendix H.

Due to the high volumes of parking in residential streets in Petone, and estimate was made of the proportion of residential and non residential parking in the residential streets in Petone, based on the assumption that vehicles observed at 5:30 belong to residents. This showed that around 19 and 14 percent of vehicles parked in residential streets during the day belonged to residents on a weekday and Saturday, with the remaining being visitor parking respectively.

Appendix A – Lower Hutt Occupancy - Data

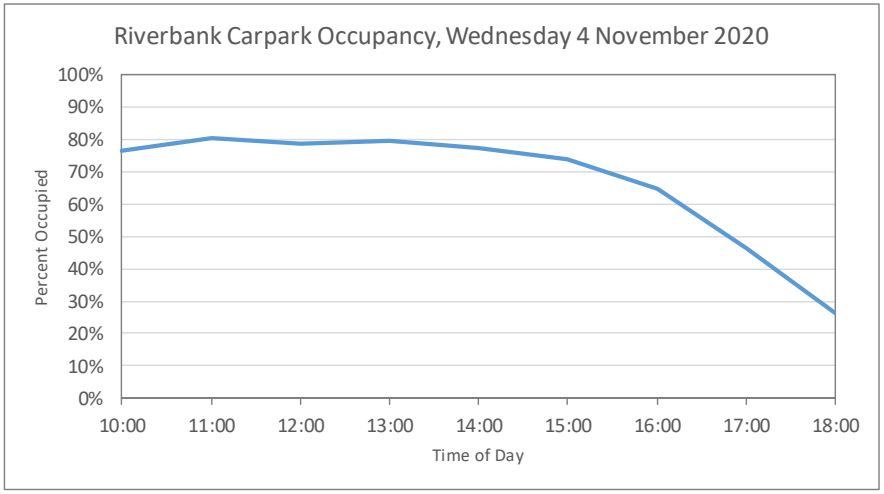
Location			Spaces				Total Occupied Spaces				Wednesday 4 November 2020				
Street	**From**	**To**	**<P120**	**P120-240**	**All Day**	**Total**	**10:00**	**11:00**	**12:00**	**13:00**	**14:00**	**15:00**	**16:00**	**17:00**	**18:00**
Daly Street	High	Andrew	1	7	0	8	5	6	7	7	7	6	6	5	7
Daly Street	Andrew	Rutherford	1	55	0	57	33	31	27	28	20	19	21	18	28
Dudley Street	Rutherford	Andrew	5	26	0	34	29	29	27	27	30	23	25	19	32
Rutherford Street	Margaret	Ped Xing	0	22	0	22	11	12	14	13	11	8	11	8	7
Rutherford Street	Ped Xing	Queen	1	29	0	30	30	25	30	29	26	22	22	18	15
Rutherford Street	Melling Link	Connolly	1	30	0	31	31	31	31	31	30	31	28	22	9
Melling Road	Connolly	High	1	5	0	6	2	4	4	2	3	3	2	3	6
High Street	Queen	Margaret	5	101	0	100	62	67	68	83	69	47	53	70	82
High Street	Margaret	Waterloo	0	31	2	29	25	26	26	26	26	23	15	20	17
High Street	Waterloo	Queen	0	49	1	48	25	34	36	41	27	33	34	28	21
High Street	Queen	Pretoria	1	24	0	25	23	23	20	20	22	21	18	20	7
High Street	Pretoria	Downer	0	27	0	27	23	21	23	22	25	23	22	25	17
High Street	Downer	Melling Roac	1	31	0	32	24	25	25	26	23	15	25	26	28
Queens Drive	High	Laings	4	7	0	9	6	6	9	3	4	5	2	7	8
Queens Drive	Laings	Margaret	8	49	0	60	47	42	49	54	48	40	52	54	56
Queens Drive	Margaret	Waterloo	2	5	0	7	6	7	6	7	5	5	6	5	0
Queens Drive	Waterloo	Kings	0	15	0	15	14	9	11	12	8	10	11	9	10
Knights Road	Laings	Stevens	4	24	0	15	9	9	13	11	14	9	10	8	5
Knights Road	Stevens	Bunny	1	14	0	15	10	10	14	10	11	8	8	12	5
Knights Road	Bunny	Bloomfield	0	13	12	20	9	12	16	14	12	6	8	5	7
Knights Road	Bloomfield	Cornwall	0	0	11	11	5	7	5	6	9	8	5	6	4
Laings Road	High	Queen	0	14	0	14	8	8	7	13	11	8	8	10	15
Laings Road	Knights	Mytle	33	20	0	50	46	45	50	50	48	38	37	34	47
Laings Road	Mytle	Bloomfield	0	22	0	22	21	21	21	21	18	20	20	11	6
Myrtle Street	Laings	Knights	0	30	20	50	25	49	44	41	50	28	22	18	9
Bloomfield Terrace	Laings	Knights	0	49	0	48	39	44	46	43	43	32	33	25	20
Bloomfield Terrace	Knights	Waterloo	0	38	5	38	30	36	36	36	33	21	37	35	35
Bloomfield Terrace	Waterloo	Kings	0	22	2	24	19	22	17	21	15	17	17	8	8
Cornwall Street	Knights	Waterloo	0	6	36	42	41	41	40	43	42	39	38	35	36
Cornwall Street	Waterloo	Kings	0	0	15	15	13	15	13	15	8	15	6	5	3
Cornwall Street	Kings	Raroa	0	21	0	21	17	19	14	13	17	19	10	12	2
Cornwall Street	Raroa	Pretoria	0	15	0	15	14	15	14	8	10	13	5	11	11
Brunswick Street	High	Kings	0	0	70	70	66	65	63	65	64	62	64	55	56
Downer Street	High	Bristol	1	89	0	90	89	89	88	88	86	75	76	61	66
Bristol Square Nor	Kings	Downer	0	20	33	52	53	52	52	52	49	46	35	23	24
Bristol Square Sou	Downer	Kings	0	16	18	35	35	33	33	32	35	28	23	18	15
Pretoria Street	High	Cornwall	0	16	0	16	12	8	12	7	10	9	5	9	10
Pretoria Street	Cornwall	Kings	40	30	0	70	64	51	66	52	46	47	64	57	55
Raroa Road	High	Cornwall	0	48	0	48	44	39	37	39	39	34	40	29	34
Kings Crescent	Queen	Bloomfield	0	14	1	15	11	10	11	10	13	14	7	6	4
Kings Crescent	Bloomfield	Cornwall	0	13	1	14	12	12	10	11	10	9	8	4	3
Kings Crescent	Cornwall	Pretoria	0	33	30	63	43	52	50	43	51	53	35	15	17
Kings Crescent	Pretoria	Bristol North	0	0	27	27	25	24	26	25	21	20	15	3	2
Kings Crescent	Bristol North	Brunswick	0	0	25	25	20	20	19	18	14	12	14	4	4
Waterloo Road	High	Queen	0	28	0	28	8	8	22	23	15	14	22	8	12
Waterloo Road	Queen	Bloomfield	1	4	0	5	5	4	5	4	4	4	3	2	2
Margaret Street	Rutherford	High	2	7	0	9	7	9	9	8	9	6	9	9	9
Margaret Street	High	Queen	2	11	0	13	9	12	12	11	12	10	11	12	10
Bunny Strret	Queen	Knights	2	5	0	7	3	7	7	6	7	7	7	2	6
Andrews Avenue	High	Daly	5	15	0	20	19	16	19	19	17	14	17	18	18
Riverbank Carpark	South End		0	0	330	330	318	311	317	314	304	299	271	193	110
Riverbank Carpark	Middle		0	0	162	162	135	140	143	152	151	145	130	104	40
Riverbank Carpark	North End	excl HN	0	0	362	362	200	235	211	211	204	185	151	100	74
Riverbank Carpark			0	0	854	854	653	686	671	677	659	629	552	397	224
Daly/Dudly/Rutherford			10	174	0	188	141	138	140	137	127	112	115	93	104
High/Queen/Margaret/Bunny/Andrew			32	376	3	401	293	304	320	338	302	259	282	305	289
Laings/Knights/Myrtle/Bloomfield			38	186	43	245	172	205	216	209	216	157	151	129	118
Cornwall/Waterloo			1	161	60	217	170	182	182	184	167	165	153	126	116
Raroa/Pretoria/Downer/Bristol/Kings			41	252	203	496	451	433	446	421	415	386	371	274	283
Total Lower Hutt On Street			122	1149	309	1547	1227	1262	1304	1289	1227	1079	1072	927	910
Total Lower Hutt			**122**	**1149**	**1163**	**2401**	**1880**	**1948**	**1975**	**1966**	**1886**	**1708**	**1624**	**1324**	**1134**

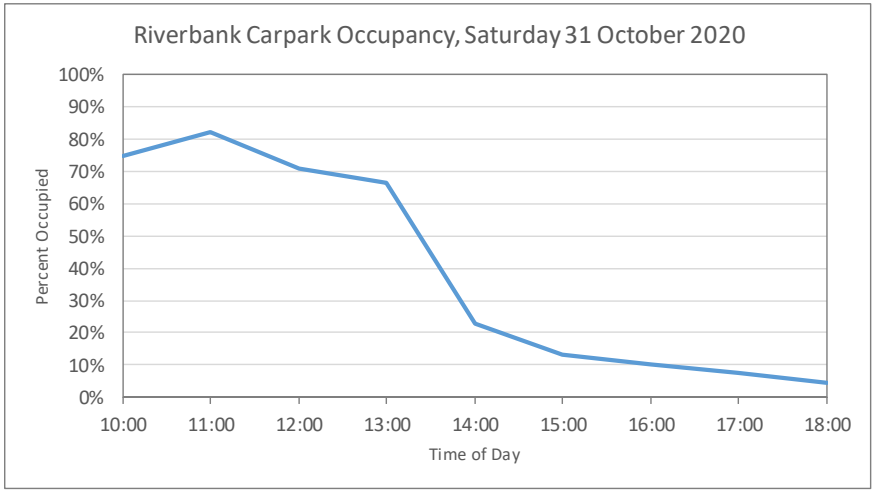
Location			Percent Occupied			Wednesday 4 November 2020					Percent Occupied		
Street	From	To	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	MAX	Average	Ave 11-15
Daly Street	High	Andrew	63%	75%	88%	88%	88%	75%	75%	63%	88%	88%	78%	84%
Daly Street	Andrew	Rutherford	58%	54%	47%	49%	35%	33%	37%	32%	49%	58%	44%	46%
Dudley Street	Rutherford	Andrew	85%	85%	79%	79%	88%	68%	74%	56%	94%	94%	79%	83%
Rutherford Street	Margaret	Ped Xing	50%	55%	64%	59%	50%	36%	50%	36%	32%	64%	48%	57%
Rutherford Street	Ped Xing	Queen	100%	83%	100%	97%	87%	73%	73%	60%	50%	100%	80%	92%
Rutherford Street	Melling Link	Connolly	100%	100%	100%	100%	97%	100%	90%	71%	29%	100%	87%	99%
Melling Road	Connolly	High	33%	67%	67%	33%	50%	50%	33%	50%	100%	100%	54%	54%
High Street	Queen	Margaret	62%	67%	68%	83%	69%	47%	53%	70%	82%	83%	67%	72%
High Street	Margaret	Waterloo	86%	90%	90%	90%	90%	79%	52%	69%	59%	90%	78%	90%
High Street	Waterloo	Queen	52%	71%	75%	85%	56%	69%	71%	58%	44%	85%	65%	72%
High Street	Queen	Pretoria	92%	92%	80%	80%	88%	84%	72%	80%	28%	92%	77%	85%
High Street	Pretoria	Downer	85%	78%	85%	81%	93%	85%	81%	93%	63%	93%	83%	84%
High Street	Downer	Melling Roac	75%	78%	78%	81%	72%	47%	78%	81%	88%	88%	75%	77%
Queens Drive	High	Laings	67%	67%	100%	33%	44%	56%	22%	78%	89%	100%	62%	61%
Queens Drive	Laings	Margaret	78%	70%	82%	90%	80%	67%	87%	90%	93%	93%	82%	80%
Queens Drive	Margaret	Waterloo	86%	100%	86%	100%	71%	71%	86%	71%	0%	100%	75%	89%
Queens Drive	Waterloo	Kings	93%	60%	73%	80%	53%	67%	73%	60%	67%	93%	70%	67%
Knights Road	Laings	Stevens	60%	60%	87%	73%	93%	60%	67%	53%	33%	93%	65%	78%
Knights Road	Stevens	Bunny	67%	67%	93%	67%	73%	53%	53%	80%	33%	93%	65%	75%
Knights Road	Bunny	Bloomfield	45%	60%	80%	70%	60%	30%	40%	25%	35%	80%	49%	68%
Knights Road	Bloomfield	Cornwall	45%	64%	45%	55%	82%	73%	45%	55%	36%	82%	56%	61%
Laings Road	High	Queen	57%	57%	50%	93%	79%	57%	57%	71%	107%	107%	70%	70%
Laings Road	Knights	Mytle	92%	90%	100%	100%	96%	76%	74%	68%	94%	100%	88%	97%
Laings Road	Mytle	Bloomfield	95%	95%	95%	95%	82%	91%	91%	50%	27%	95%	80%	92%
Myrtle Street	Laings	Knights	50%	98%	88%	82%	100%	56%	44%	36%	18%	100%	64%	92%
Bloomfield Terrace	Laings	Knights	81%	92%	96%	90%	90%	67%	69%	52%	42%	96%	75%	92%
Bloomfield Terrace	Knights	Waterloo	79%	95%	95%	95%	87%	55%	97%	92%	92%	97%	87%	93%
Bloomfield Terrace	Waterloo	Kings	79%	92%	71%	88%	63%	71%	71%	33%	33%	92%	67%	78%
Cornwall Street	Knights	Waterloo	98%	98%	95%	102%	100%	93%	90%	83%	86%	102%	94%	99%
Cornwall Street	Waterloo	Kings	87%	100%	87%	100%	53%	100%	40%	33%	20%	100%	69%	85%
Cornwall Street	Kings	Raroa	81%	90%	67%	62%	81%	90%	48%	57%	10%	90%	65%	75%
Cornwall Street	Raroa	Pretoria	93%	100%	93%	53%	67%	87%	33%	73%	73%	100%	75%	78%
Brunswick Street	High	Kings	94%	93%	90%	93%	91%	89%	91%	79%	80%	94%	89%	92%
Downer Street	High	Bristol	99%	99%	98%	98%	96%	83%	84%	68%	73%	99%	89%	98%
Bristol Square Nort	Kings	Downer	102%	100%	100%	100%	94%	88%	66%	44%	45%	102%	82%	99%
Bristol Square Sout	Downer	Kings	100%	94%	94%	91%	100%	80%	66%	51%	43%	100%	80%	95%
Pretoria Street	High	Cornwall	75%	50%	75%	44%	63%	56%	31%	56%	63%	75%	57%	58%
Pretoria Street	Cornwall	Kings	91%	73%	94%	74%	66%	67%	91%	81%	79%	94%	80%	77%
Raroa Road	High	Cornwall	92%	81%	77%	81%	81%	71%	83%	60%	71%	92%	78%	80%
Kings Crescent	Queen	Bloomfield	73%	67%	73%	67%	87%	93%	47%	40%	27%	93%	64%	73%
Kings Crescent	Bloomfield	Cornwall	86%	86%	71%	79%	71%	64%	57%	29%	21%	86%	63%	77%
Kings Crescent	Cornwall	Pretoria	68%	83%	79%	68%	81%	84%	56%	24%	27%	84%	63%	78%
Kings Crescent	Pretoria	Bristol North	93%	89%	96%	93%	78%	74%	56%	11%	7%	96%	66%	89%
Kings Crescent	Bristol North	Brunswick	80%	80%	76%	72%	56%	48%	56%	16%	16%	80%	56%	71%
Waterloo Road	High	Queen	29%	29%	79%	82%	54%	50%	79%	29%	43%	82%	52%	61%
Waterloo Road	Queen	Bloomfield	100%	80%	100%	80%	80%	80%	60%	40%	40%	100%	73%	85%
Margaret Street	Rutherford	High	78%	100%	100%	89%	100%	67%	100%	100%	100%	100%	93%	97%
Margaret Street	High	Queen	69%	92%	92%	85%	92%	77%	85%	92%	77%	92%	85%	90%
Bunny Strret	Queen	Knights	43%	100%	100%	86%	100%	100%	100%	29%	86%	100%	83%	96%
Andrews Avenue	High	Daly	95%	80%	95%	95%	85%	70%	85%	90%	90%	95%	87%	89%
Riverbank Carpark	South End		96%	94%	96%	95%	92%	91%	82%	58%	33%	96%	82%	94%
Riverbank Carpark	Middle		83%	86%	88%	94%	93%	90%	80%	64%	25%	94%	78%	90%
Riverbank Carpark	North End	excl HN	55%	65%	58%	58%	56%	51%	42%	28%	20%	65%	48%	59%
Riverbank Carpark			76%	80%	79%	79%	77%	74%	65%	46%	26%	80%	67%	79%
Daly/Dudly/Rutherford			75%	73%	74%	73%	68%	60%	61%	49%	55%	75%	65%	72%
High/Queen/Margaret/Bunny/Andrew			73%	76%	80%	84%	75%	65%	70%	76%	72%	84%	75%	79%
Laings/Knights/Myrtle/Bloomfield			70%	84%	88%	85%	88%	64%	62%	53%	48%	88%	71%	86%
Cornwall/Waterloo			78%	84%	84%	85%	77%	76%	71%	58%	53%	85%	74%	82%
Raroa/Pretoria/Downer/Bristol/Kings			91%	87%	90%	85%	84%	78%	75%	55%	57%	91%	78%	86%
Total Lower Hutt On Street			79%	82%	84%	83%	79%	70%	69%	60%	59%	84%	74%	82%
Total Lower Hutt			**78%**	**81%**	**82%**	**82%**	**79%**	**71%**	**68%**	**55%**	**47%**	**82%**	**71%**	**81%**

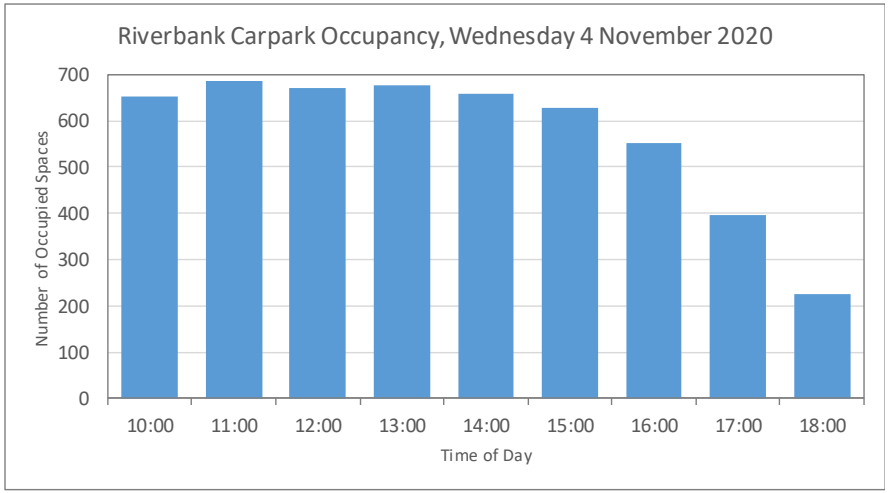
Location			Spaces				Total Occupied Spaces				Saturday 31 October 2020				
Street	From	To	<P120	P120-240	All Day	Total	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Daly Street	High	Andrew	1	7	0	8	11	0	8	7	8	8	5	3	5
Daly Street	Andrew	Rutherford	1	55	0	57	57	36	34	25	16	15	13	8	7
Dudley Street	Rutherford	Andrew	5	26	0	34	34	30	30	29	18	27	21	19	14
Rutherford Street	Margaret	Ped Xing	0	22	0	22	23	17	16	18	10	12	8	6	3
Rutherford Street	Ped Xing	Queen	1	29	0	30	30	25	25	10	10	9	10	11	5
Rutherford Street	Melling Link	Connolly	1	30	0	31	24	22	22	20	11	14	10	10	8
Melling Road	Connolly	High	1	5	0	6	4	4	3	5	5	5	4	5	6
High Street	Queen	Margaret	5	101	0	100	100	91	99	98	92	92	79	69	80
High Street	Margaret	Waterloo	0	31	2	29	29	25	28	28	27	29	22	16	24
High Street	Waterloo	Queen	0	49	1	48	48	42	41	38	34	38	30	17	21
High Street	Queen	Pretoria	1	24	0	25	23	24	25	24	20	15	21	10	6
High Street	Pretoria	Downer	0	27	0	27	17	19	22	28	27	8	4	0	1
High Street	Downer	Melling Roac	1	31	0	32	23	30	27	28	22	18	16	10	19
Queens Drive	High	Laings	4	7	0	9	9	9	9	9	8	11	1	2	5
Queens Drive	Laings	Margaret	8	49	0	60	60	63	65	58	51	50	52	42	56
Queens Drive	Margaret	Waterloo	2	5	0	7	6	6	6	5	6	7	4	3	2
Queens Drive	Waterloo	Kings	0	15	0	15	15	14	15	15	14	11	6	1	1
Knights Road	Laings	Stevens	4	24	0	15	15	15	12	15	10	14	10	10	11
Knights Road	Stevens	Bunny	1	14	0	15	15	15	15	15	15	15	13	11	9
Knights Road	Bunny	Bloomfield	0	13	12	20	18	18	19	19	20	13	17	12	18
Knights Road	Bloomfield	Cornwall	0	0	9	9	1	9	9	9	9	6	3	2	9
Laings Road	High	Queen	0	14	0	14	1	14	14	14	13	12	12	11	10
Laings Road	Knights	Mytle	33	20	0	50	48	35	46	44	50	47	50	49	49
Laings Road	Mytle	Bloomfield	0	22	0	22	8	13	15	14	13	22	21	21	22
Myrtle Street	Laings	Knights	0	30	20	50	42	44	43	42	46	46	40	35	41
Bloomfield Terrace	Laings	Knights	0	49	0	48	48	38	44	34	36	32	36	43	43
Bloomfield Terrace	Knights	Waterloo	0	38	5	43	38	37	38	37	38	37	37	30	34
Bloomfield Terrace	Waterloo	Kings	0	22	2	24	24	20	24	22	20	21	12	16	9
Cornwall Street	Knights	Waterloo	0	6	36	42	35	39	42	42	39	38	41	26	21
Cornwall Street	Waterloo	Kings	0	0	15	15	15	12	13	15	13	15	8	5	2
Cornwall Street	Kings	Raroa	0	21	0	21	14	4	2	8	7	3	5	2	1
Cornwall Street	Raroa	Pretoria	0	15	0	15	15	12	13	4	2	2	8	5	0
Brunswick Street	High	Kings	0	0	70	70	66	66	65	66	64	58	61	59	61
Downer Street	High	Bristol	1	89	0	90	70	65	60	61	49	41	58	39	49
Bristol Square Nor	Kings	Downer	0	20	33	52	30	29	31	32	28	23	23	22	28
Bristol Square Sou	Downer	Kings	0	16	18	35	12	13	10	7	9	6	6	6	9
Pretoria Street	High	Cornwall	0	16	0	16	8	5	11	10	7	7	10	4	5
Pretoria Street	Cornwall	Kings	40	30	0	70	61	41	38	32	30	42	38	38	32
Raroa Road	High	Cornwall	0	48	0	48	38	37	34	34	41	34	32	28	24
Kings Crescent	Queen	Bloomfield	0	14	1	15	6	9	8	15	12	8	9	13	7
Kings Crescent	Bloomfield	Cornwall	0	13	1	14	4	8	10	12	9	11	5	3	8
Kings Crescent	Cornwall	Pretoria	0	33	30	63	22	23	23	40	19	14	14	12	10
Kings Crescent	Pretoria	Bristol North	0	0	27	27	11	27	11	19	4	5	3	6	2
Kings Crescent	Bristol North	Brunswick	0	0	25	25	4	0	1	4	2	4	1	4	2
Waterloo Road	High	Queen	0	28	0	28	26	27	28	26	26	24	17	14	12
Waterloo Road	Queen	Bloomfield	1	4	0	5	3	5	5	5	3	5	1	4	5
Margaret Street	Rutherford	High	2	7	0	9	9	8	9	9	9	8	9	5	6
Margaret Street	High	Queen	2	11	0	13	11	12	12	12	12	12	12	12	12
Bunny Strret	Queen	Knights	2	5	0	7	7	7	7	7	7	7	7	3	5
Andrews Avenue	High	Daly	5	15	0	20	20	18	18	19	19	18	16	20	19
Riverbank Carpark	South End		0	0	330	330	83	68	62	62	81	43	41	27	19
Riverbank Carpark	Middle		0	0	162	162	156	160	112	93	45	27	12	9	5
Riverbank Carpark	North End	excl HN	0	0	362	362	210	266	252	243	11	10	8	9	4
Riverbank Carpark			0	0	854	854	449	494	426	398	137	80	61	45	28
Daly/Dudly/Rutherford			10	174	0	188	183	134	138	114	78	90	71	62	48
High/ Queen/Margaret/Bunny/Andrew			32	376	3	401	377	368	383	378	348	324	279	210	257
Laings/Knights/Myrtle/Bloomfield			38	186	41	243	196	201	217	206	212	207	202	194	212
Bloomfield/Cornwall/Waterloo			1	161	60	222	180	173	183	186	169	164	143	118	99
Raroa/Pretoria/Downer/Bristol/Kings			41	252	203	496	322	306	284	305	253	234	246	218	222
Total Lower Hutt On Street			122	1149	307	1550	1258	1182	1205	1189	1060	1019	941	802	838
Total Lower Hutt			**122**	**1149**	**1161**	**2404**	**1707**	**1676**	**1631**	**1587**	**1197**	**1099**	**1002**	**847**	**866**

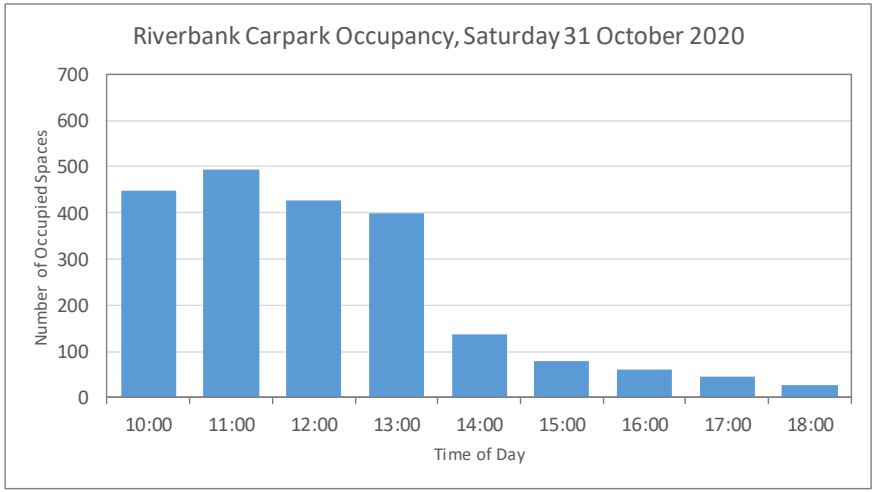
Location			Percent Occupied			Saturday 31 October 2020						Percent Occupied		
Street	**From**	**To**	**10:00**	**11:00**	**12:00**	**13:00**	**14:00**	**15:00**	**16:00**	**17:00**	**18:00**	**MAX**	**Average**	**Ave 11-15**
Daly Street	High	Andrew	138%	0%	100%	88%	100%	100%	63%	38%	63%	138%	76%	72%
Daly Street	Andrew	Rutherford	100%	63%	60%	44%	28%	26%	23%	14%	12%	100%	41%	49%
Dudley Street	Rutherford	Andrew	100%	88%	88%	85%	53%	79%	62%	56%	41%	100%	73%	79%
Rutherford Street	Margaret	Ped Xing	105%	77%	73%	82%	45%	55%	36%	27%	14%	105%	57%	69%
Rutherford Street	Ped Xing	Queen	100%	83%	83%	33%	33%	30%	33%	37%	17%	100%	50%	58%
Rutherford Street	Melling Link	Connolly	77%	71%	71%	65%	35%	45%	32%	32%	26%	77%	51%	60%
Melling Road	Connolly	High	67%	67%	50%	83%	83%	83%	67%	83%	100%	100%	76%	71%
High Street	Queen	Margaret	100%	91%	99%	98%	92%	92%	79%	69%	80%	100%	89%	95%
High Street	Margaret	Waterloo	100%	86%	97%	97%	93%	100%	76%	55%	83%	100%	87%	93%
High Street	Waterloo	Queen	100%	88%	85%	79%	71%	79%	63%	35%	44%	100%	72%	81%
High Street	Queen	Pretoria	92%	96%	100%	96%	80%	60%	84%	40%	24%	100%	75%	93%
High Street	Pretoria	Downer	63%	70%	81%	104%	100%	30%	15%	0%	4%	104%	52%	89%
High Street	Downer	Melling Roac	72%	94%	84%	88%	69%	56%	50%	31%	59%	94%	67%	84%
Queens Drive	High	Laings	100%	100%	100%	100%	89%	122%	11%	22%	56%	122%	78%	97%
Queens Drive	Laings	Margaret	100%	105%	108%	97%	85%	83%	87%	70%	93%	108%	92%	99%
Queens Drive	Margaret	Waterloo	86%	86%	86%	71%	86%	100%	57%	43%	29%	100%	71%	82%
Queens Drive	Waterloo	Kings	100%	93%	100%	100%	93%	73%	40%	7%	7%	100%	68%	97%
Knights Road	Laings	Stevens	100%	100%	80%	100%	67%	93%	67%	67%	73%	100%	83%	87%
Knights Road	Stevens	Bunny	100%	100%	100%	100%	100%	100%	87%	73%	60%	100%	91%	100%
Knights Road	Bunny	Bloomfield	90%	90%	95%	95%	100%	65%	85%	60%	90%	100%	86%	95%
Knights Road	Bloomfield	Cornwall	11%	100%	100%	100%	100%	67%	33%	22%	100%	100%	70%	100%
Laings Road	High	Queen	7%	100%	100%	100%	93%	86%	86%	79%	71%	100%	80%	98%
Laings Road	Knights	Mytle	96%	70%	92%	88%	100%	94%	100%	98%	98%	100%	93%	88%
Laings Road	Mytle	Bloomfield	36%	59%	68%	64%	59%	100%	95%	95%	100%	100%	75%	63%
Myrtle Street	Laings	Knights	84%	88%	86%	84%	92%	92%	80%	70%	82%	92%	84%	88%
Bloomfield Terrace	Laings	Knights	100%	79%	92%	71%	75%	67%	75%	90%	90%	100%	82%	79%
Bloomfield Terrace	Knights	Waterloo	88%	86%	88%	86%	88%	86%	86%	70%	79%	88%	84%	87%
Bloomfield Terrace	Waterloo	Kings	100%	83%	100%	92%	83%	88%	50%	67%	38%	100%	78%	90%
Cornwall Street	Knights	Waterloo	83%	93%	100%	100%	93%	90%	98%	62%	50%	100%	85%	96%
Cornwall Street	Waterloo	Kings	100%	80%	87%	100%	87%	100%	53%	33%	13%	100%	73%	88%
Cornwall Street	Kings	Raroa	67%	19%	10%	38%	33%	14%	24%	10%	5%	67%	24%	25%
Cornwall Street	Raroa	Pretoria	100%	80%	87%	27%	13%	13%	53%	33%	0%	100%	45%	52%
Brunswick Street	High	Kings	94%	94%	93%	94%	91%	83%	87%	84%	87%	94%	90%	93%
Downer Street	High	Bristol	78%	72%	67%	68%	54%	46%	64%	43%	54%	78%	61%	65%
Bristol Square Nor	Kings	Downer	59%	56%	59%	62%	53%	44%	43%	42%	55%	62%	52%	57%
Bristol Square Sou	Downer	Kings	34%	37%	29%	20%	26%	17%	17%	17%	26%	37%	25%	28%
Pretoria Street	High	Cornwall	50%	31%	69%	63%	44%	44%	63%	25%	31%	69%	47%	52%
Pretoria Street	Cornwall	Kings	87%	59%	54%	46%	43%	60%	54%	54%	46%	87%	56%	50%
Raroa Road	High	Cornwall	79%	77%	71%	71%	85%	71%	67%	58%	50%	85%	70%	76%
Kings Crescent	Queen	Bloomfield	40%	60%	53%	100%	80%	53%	60%	87%	47%	100%	64%	73%
Kings Crescent	Bloomfield	Cornwall	29%	57%	71%	86%	64%	79%	36%	21%	57%	86%	56%	70%
Kings Crescent	Cornwall	Pretoria	35%	37%	37%	63%	30%	22%	22%	19%	16%	63%	31%	42%
Kings Crescent	Pretoria	Bristol North	41%	100%	41%	70%	15%	19%	11%	22%	7%	100%	36%	56%
Kings Crescent	Bristol North	Brunswick	16%	0%	4%	16%	8%	16%	4%	16%	8%	16%	10%	7%
Waterloo Road	High	Queen	93%	96%	100%	93%	93%	86%	61%	50%	43%	100%	79%	96%
Waterloo Road	Queen	Bloomfield	60%	100%	100%	100%	60%	100%	20%	80%	100%	100%	80%	90%
Margaret Street	Rutherford	High	100%	89%	100%	100%	100%	89%	100%	56%	67%	100%	89%	97%
Margaret Street	High	Queen	85%	92%	92%	92%	92%	92%	92%	92%	92%	92%	91%	92%
Bunny Strret	Queen	Knights	100%	100%	100%	100%	100%	100%	100%	43%	71%	100%	90%	100%
Andrews Avenue	High	Daly	100%	90%	90%	95%	95%	90%	80%	100%	95%	100%	93%	93%
Riverbank Carpark	South End		25%	21%	19%	19%	25%	13%	12%	8%	6%	25%	16%	21%
Riverbank Carpark	Middle		96%	99%	69%	57%	28%	17%	7%	6%	3%	99%	42%	63%
Riverbank Carpark	North End	excl HN	58%	73%	70%	67%	3%	3%	2%	2%	1%	73%	31%	53%
Riverbank Carpark			53%	58%	50%	47%	16%	9%	7%	5%	3%	58%	28%	43%
Daly/Dudly/Rutherford			97%	71%	73%	61%	41%	48%	38%	33%	26%	97%	54%	62%
High/ Queen/Margaret/Bunny/Andrew			94%	92%	96%	94%	87%	81%	70%	52%	64%	96%	81%	92%
Laings/Knights/Myrtle/Bloomfield			81%	83%	89%	85%	87%	85%	83%	80%	87%	89%	84%	86%
Bloomfield/Cornwall/Waterloo			81%	78%	82%	84%	76%	74%	64%	53%	45%	84%	71%	80%
Raroa/Pretoria/Downer/Bristol/Kings			65%	62%	57%	61%	51%	47%	49%	44%	45%	65%	54%	58%
Total Lower Hutt On Street			81%	76%	78%	77%	68%	66%	61%	52%	54%	81%	68%	75%
Total Lower Hutt			**71%**	**70%**	**68%**	**66%**	**50%**	**46%**	**42%**	**35%**	**36%**	**71%**	**54%**	**63%**

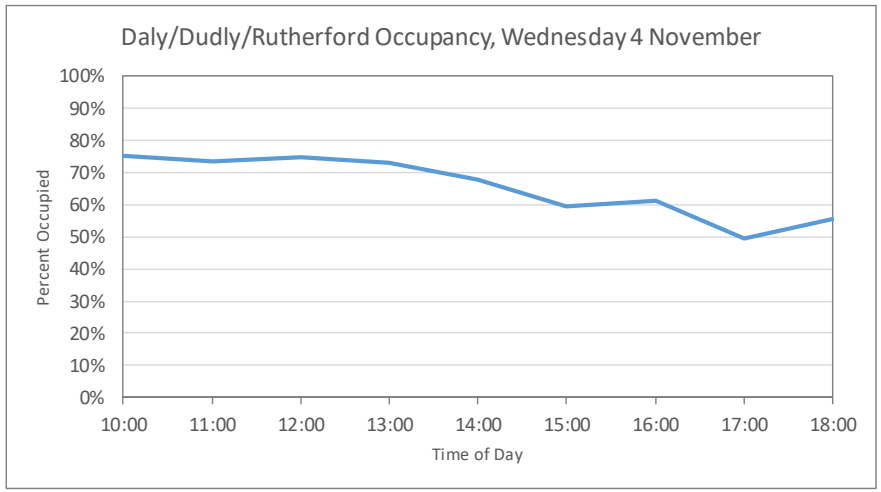
Appendix B – Lower Hutt Occupancy – Graphs

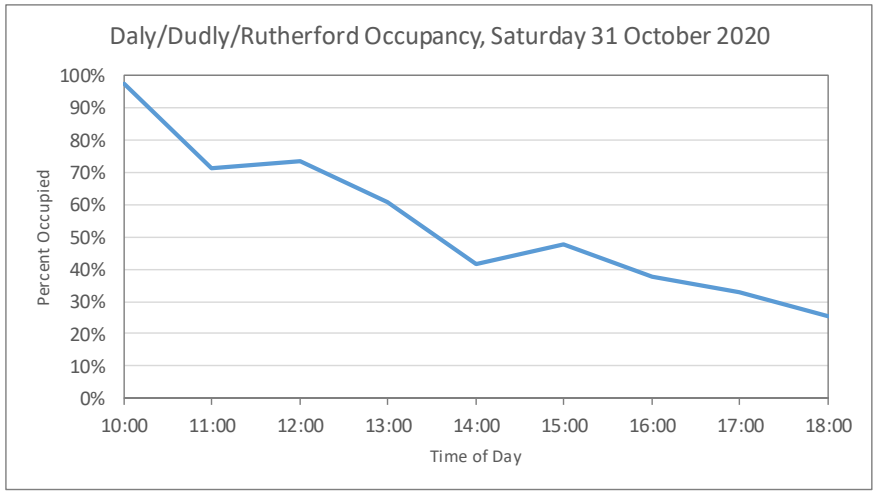


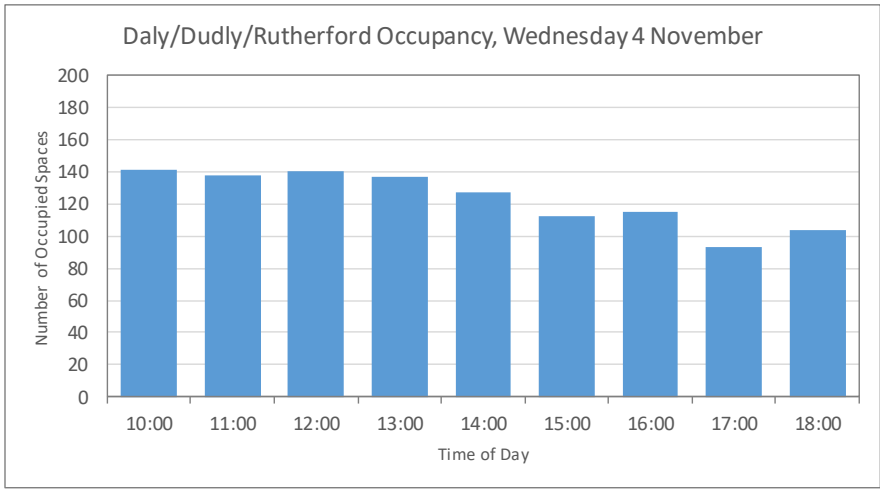


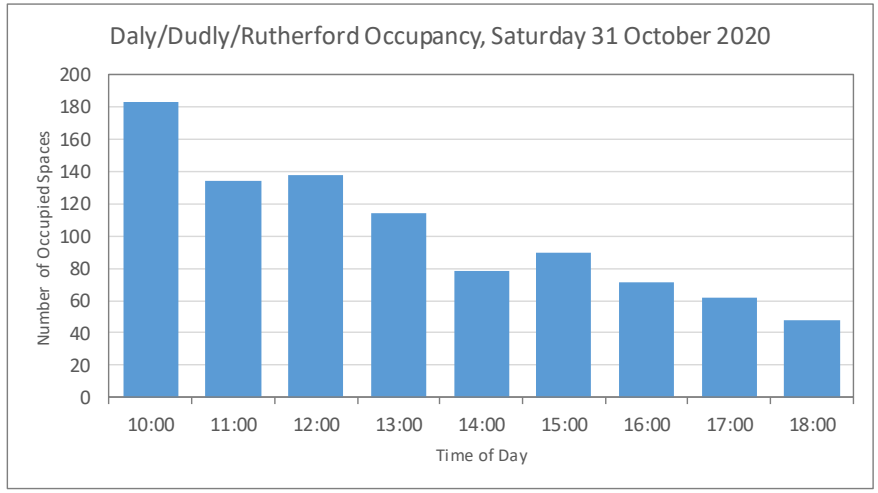


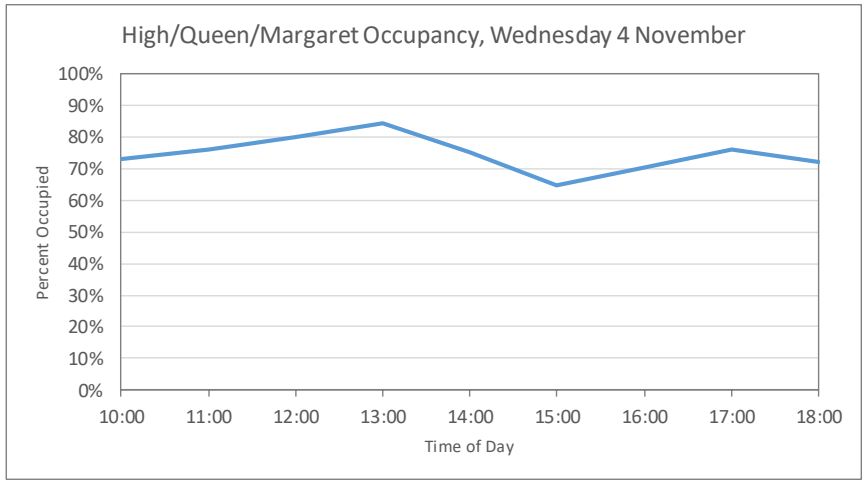


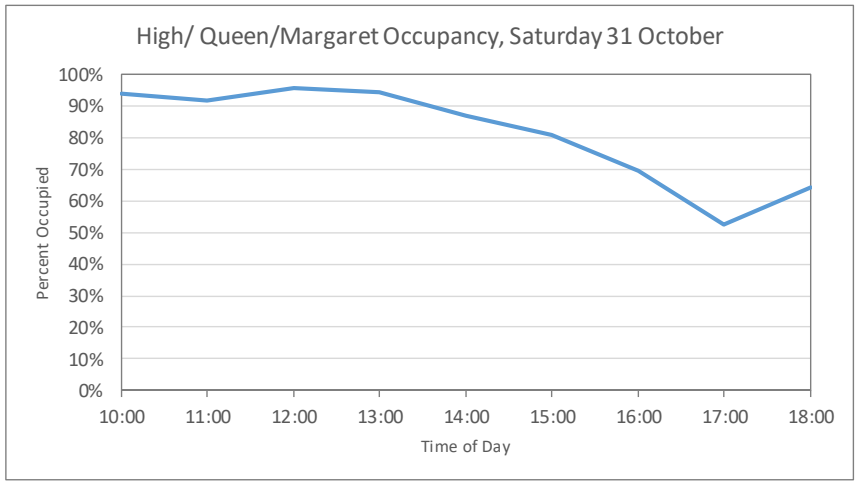

Daly/Dudly/Rutherford Occupancy, Wednesday 4 November
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

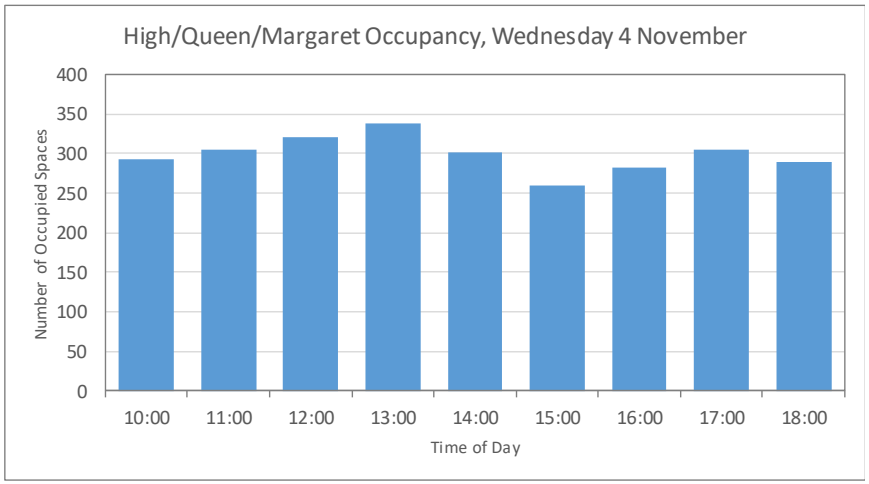

Daly/Dudly/Rutherford Occupancy, Saturday 31 October 2020
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

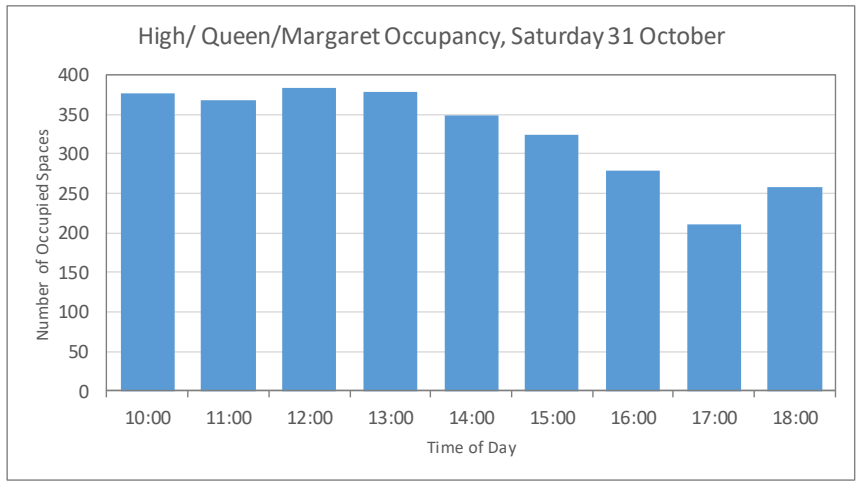

Daly/Dudly/Rutherford Occupancy, Wednesday 4 November
Number of Occupied Spaces
200
180
160
140
120
100
80
60
40
20
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

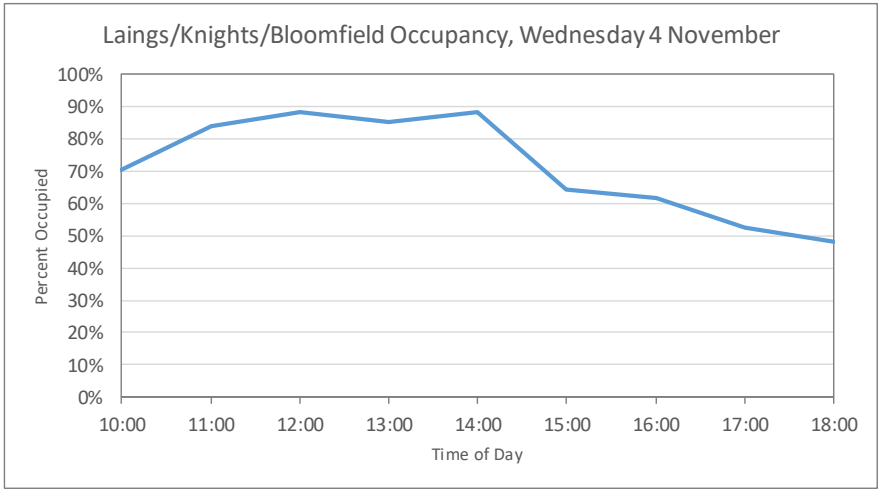

Daly/Dudly/Rutherford Occupancy, Saturday 31 October 2020
Number of Occupied Spaces
200
180
160
140
120
100
80
60
40
20
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

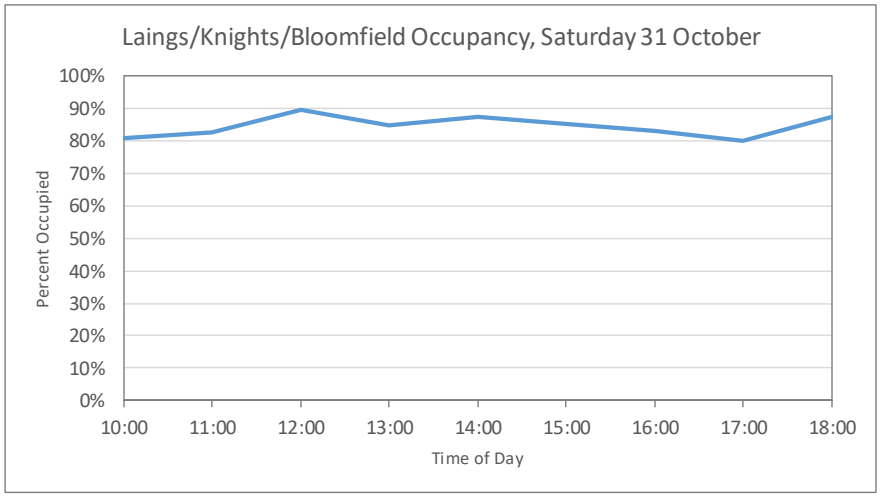

High/Queen/Margaret Occupancy, Wednesday 4 November
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

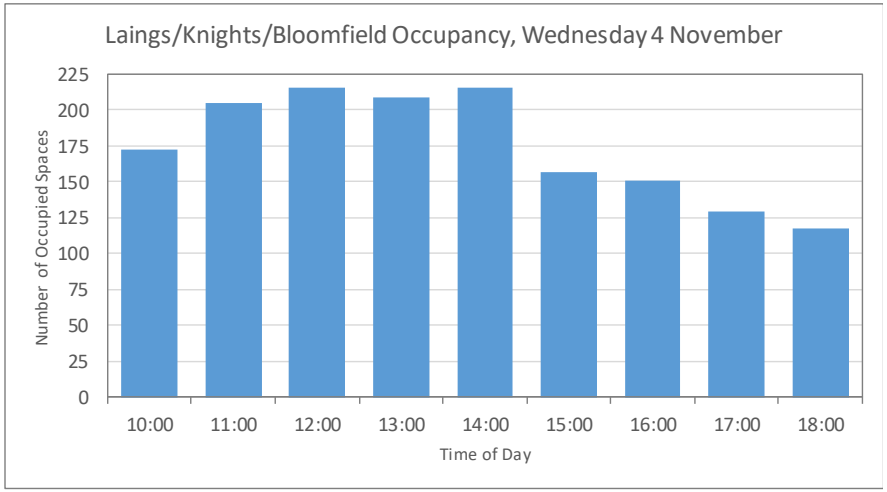

High/ Queen/Margaret Occupancy, Saturday 31 October
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

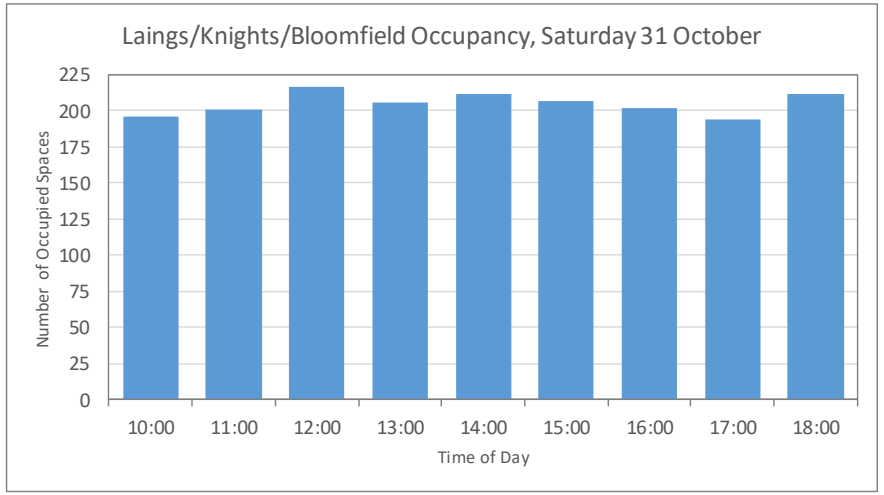

High/Queen/Margaret Occupancy, Wednesday 4 November
Number of Occupied Spaces
400
350
300
250
200
150
100
50
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

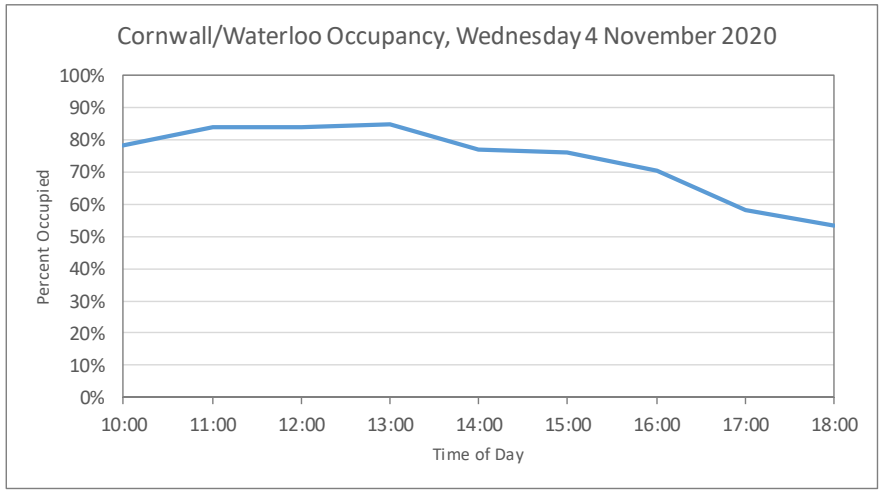

High/ Queen/Margaret Occupancy, Saturday 31 October
Number of Occupied Spaces
400
350
300
250
200
150
100
50
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

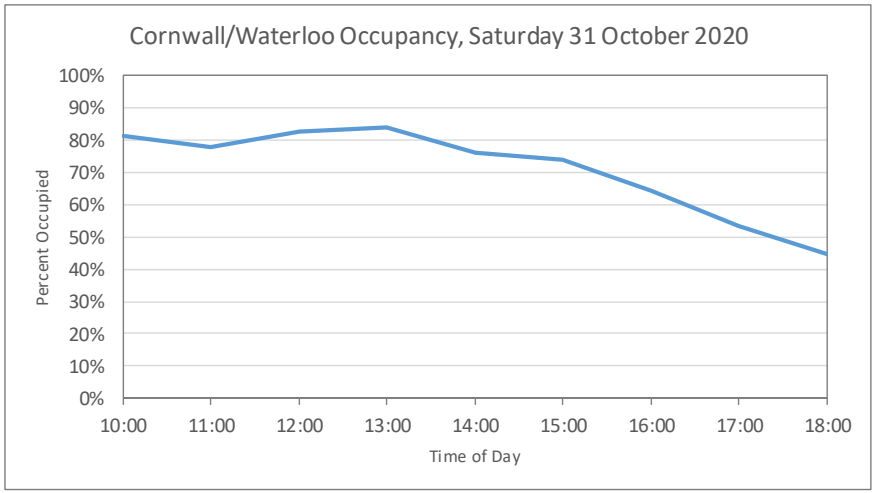

Laings/Knights/Bloomfield Occupancy, Wednesday 4 November
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

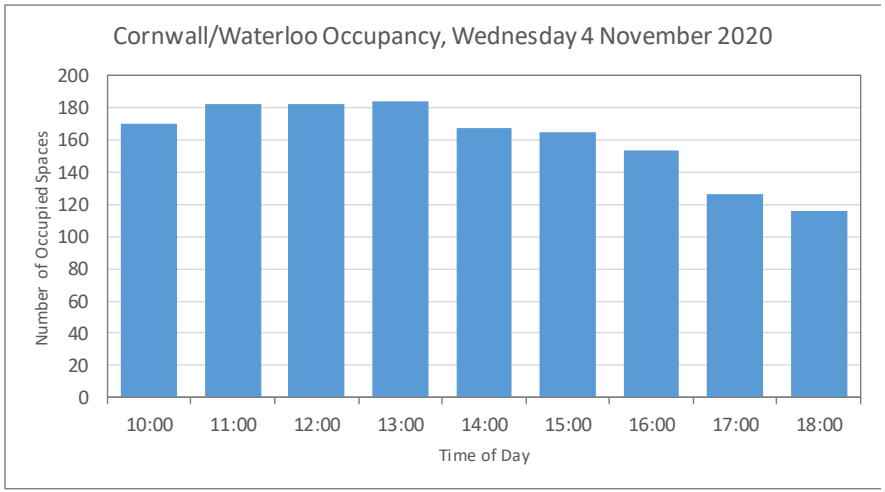

Laings/Knights/Bloomfield Occupancy, Saturday 31 October
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

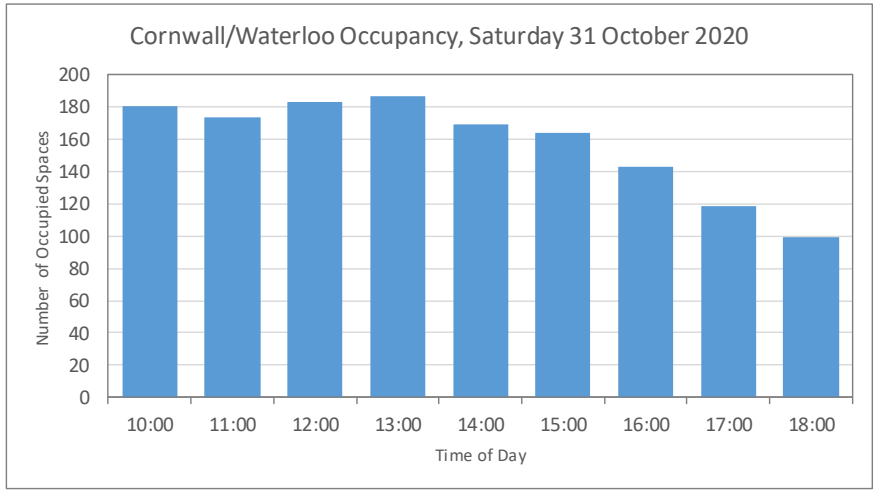

Laings/Knights/Bloomfield Occupancy, Wednesday 4 November
Number of Occupied Spaces
225
200
175
150
125
100
75
50
25
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

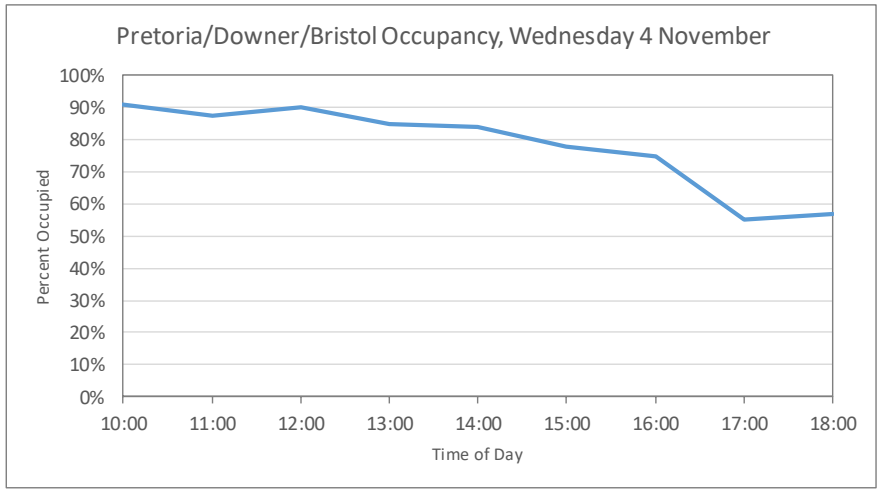

Laings/Knights/Bloomfield Occupancy, Saturday 31 October
Number of Occupied Spaces
225
200
175
150
125
100
75
50
25
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

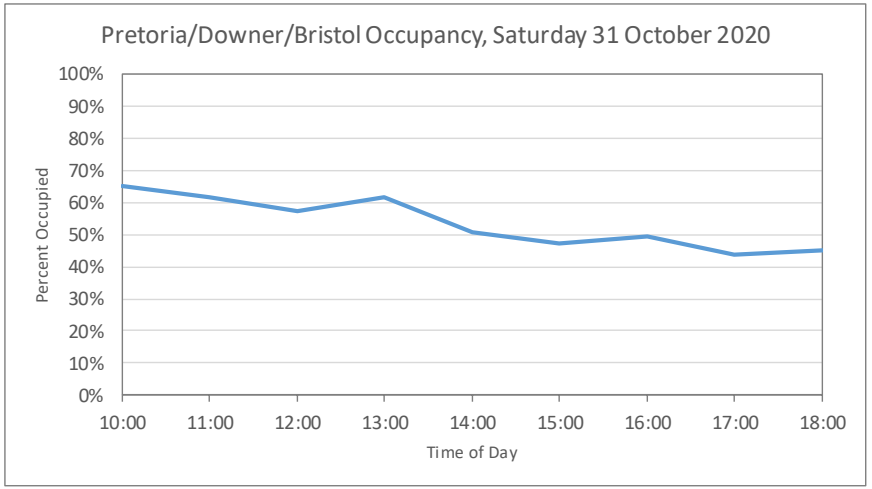

Cornwall/Waterloo Occupancy, Wednesday 4 November 2020
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

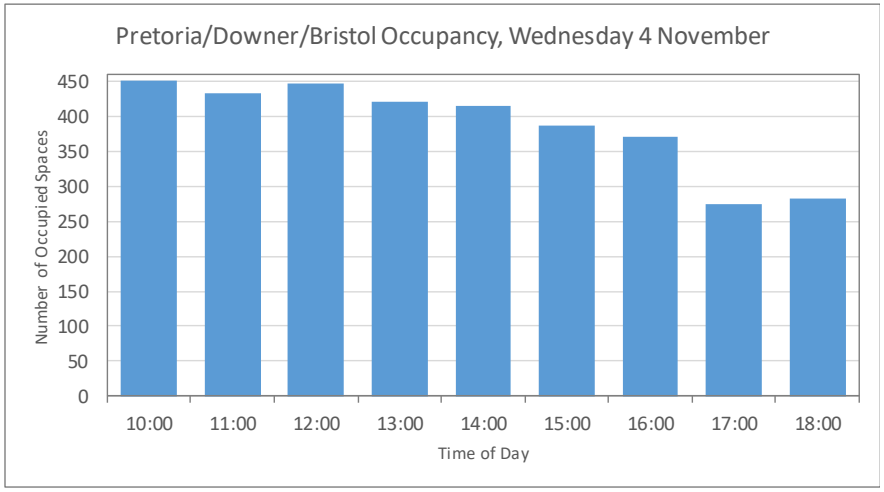

Cornwall/Waterloo Occupancy, Saturday 31 October 2020
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

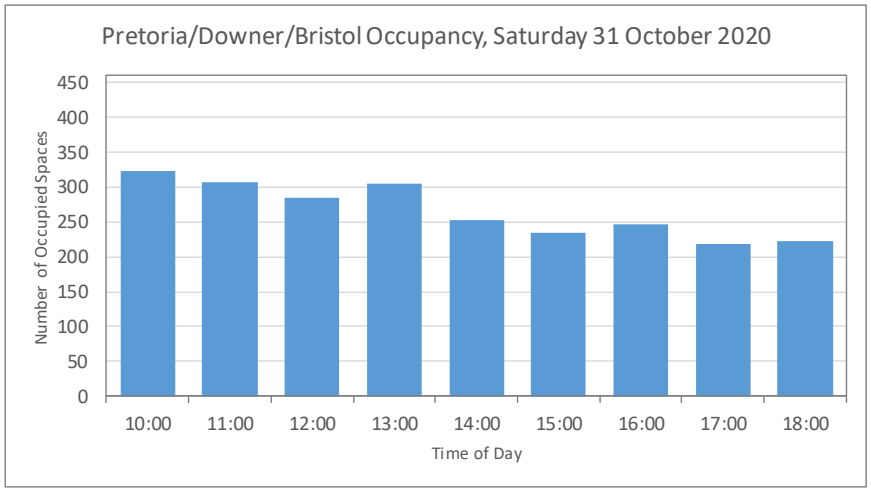

Cornwall/Waterloo Occupancy, Wednesday 4 November 2020
Number of Occupied Spaces
200
180
160
140
120
100
80
60
40
20
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

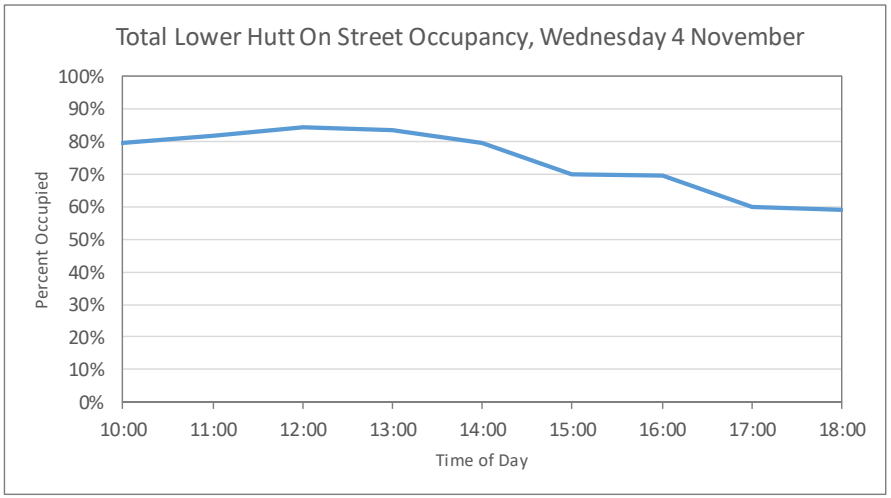

Cornwall/Waterloo Occupancy, Saturday 31 October 2020
Number of Occupied Spaces
200
180
160
140
120
100
80
60
40
20
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

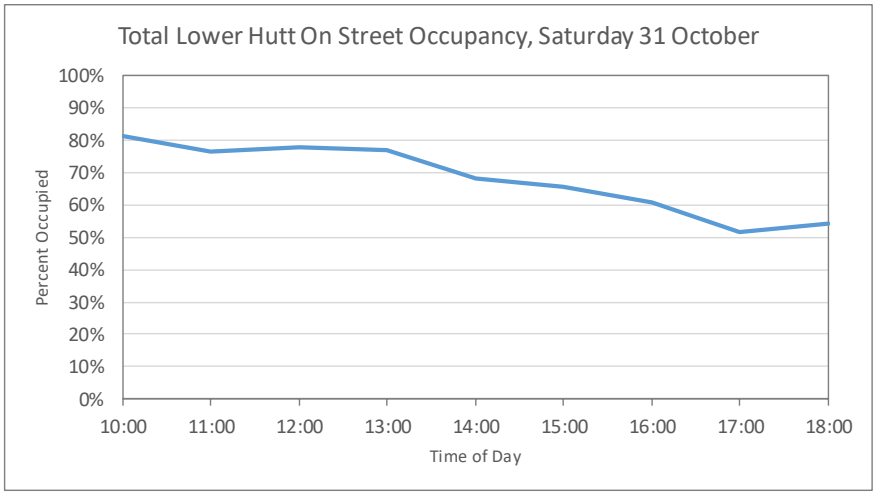

Pretoria/Downer/Bristol Occupancy, Wednesday 4 November
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

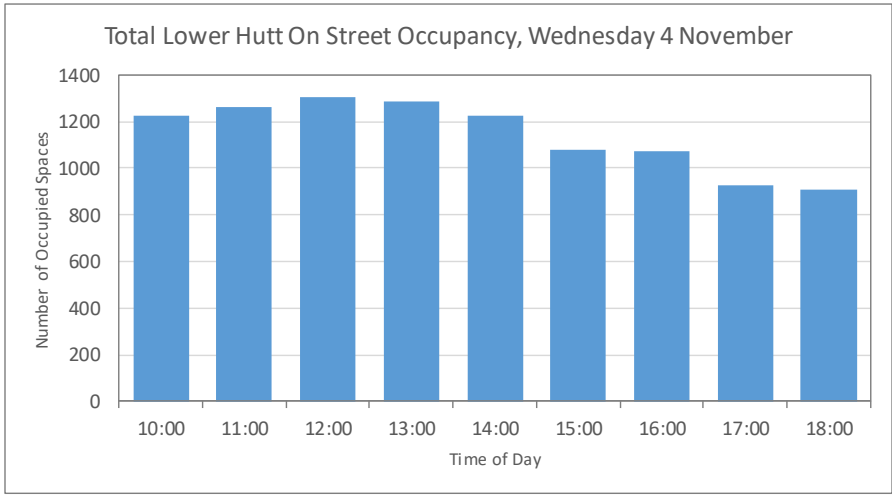

Pretoria/Downer/Bristol Occupancy, Saturday 31 October 2020
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

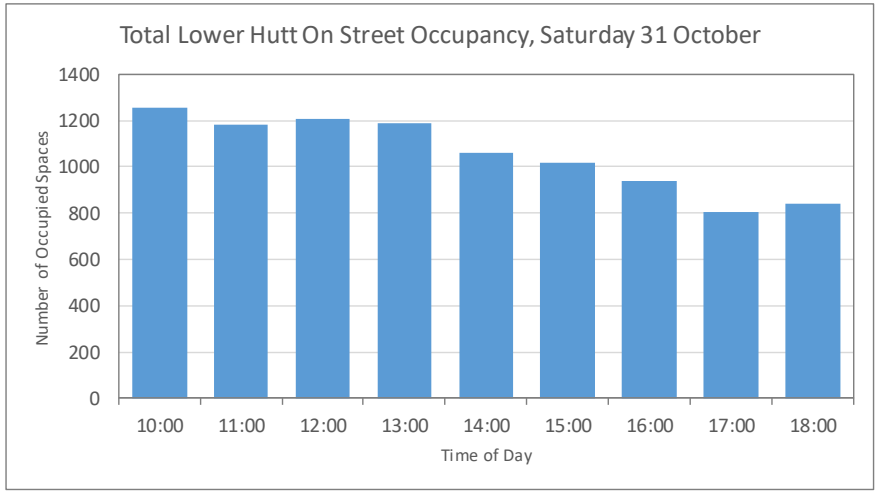

Pretoria/Downer/Bristol Occupancy, Wednesday 4 November
Number of Occupied Spaces
450
400
350
300
250
200
150
100
50
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

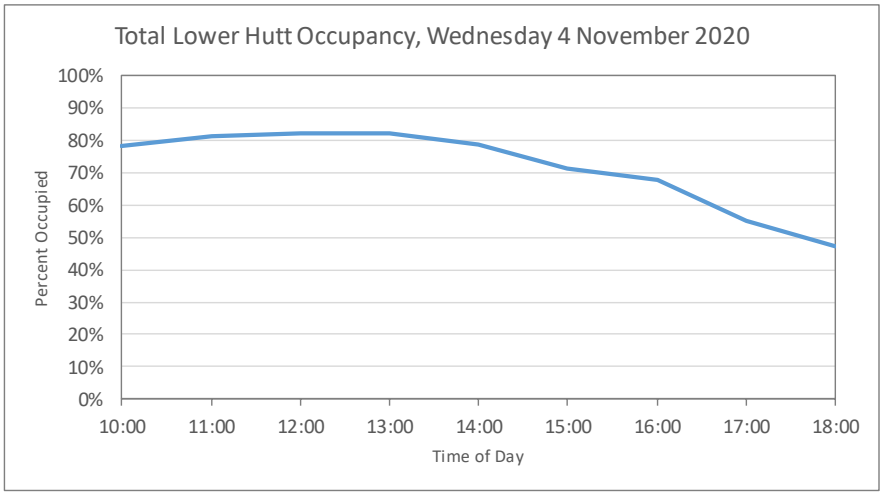

Pretoria/Downer/Bristol Occupancy, Saturday 31 October 2020
Number of Occupied Spaces
450
400
350
300
250
200
150
100
50
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

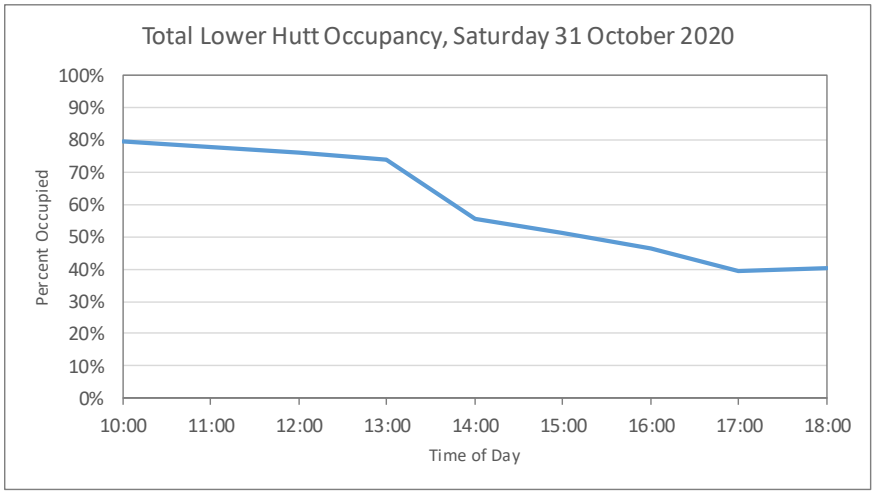

Total Lower Hutt On Street Occupancy, Wednesday 4 November
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

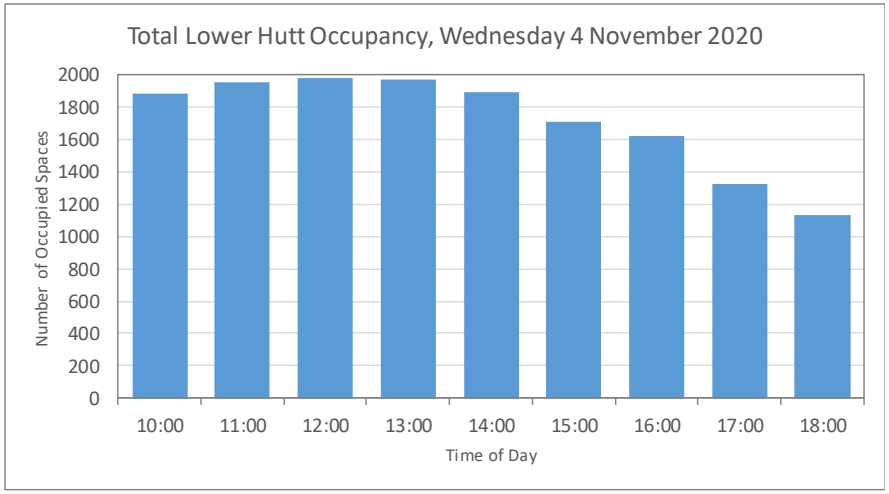

Total Lower Hutt On Street Occupancy, Saturday 31 October
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

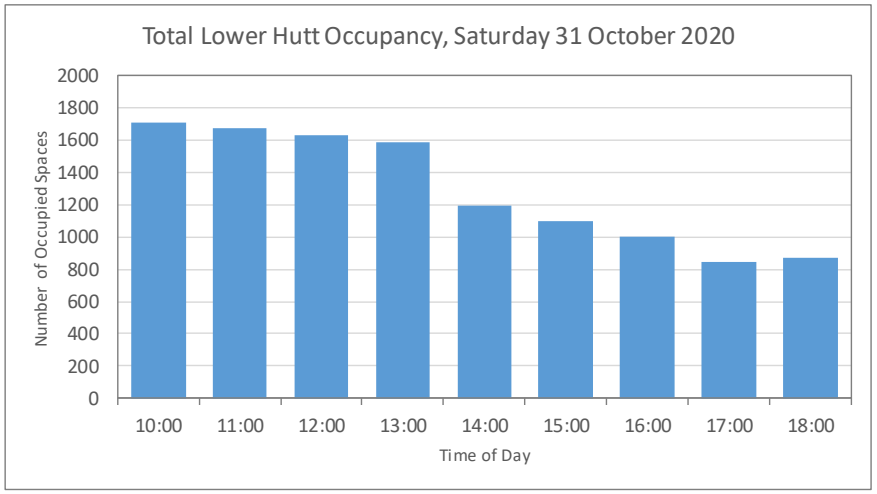

Total Lower Hutt On Street Occupancy, Wednesday 4 November
Number of Occupied Spaces
1400
1200
1000
800
600
400
200
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day


Total Lower Hutt On Street Occupancy, Saturday 31 October
Number of Occupied Spaces
1400
1200
1000
800
600
400
200
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day


Total Lower Hutt Occupancy, Wednesday 4 November 2020
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day


Total Lower Hutt Occupancy, Saturday 31 October 2020
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day


Total Lower Hutt Occupancy, Wednesday 4 November 2020
Number of Occupied Spaces
2000
1800
1600
1400
1200
1000
800
600
400
200
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day


Total Lower Hutt Occupancy, Saturday 31 October 2020
Number of Occupied Spaces
2000
1800
1600
1400
1200
1000
800
600
400
200
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

Appendix C – Petone Occupancy - Data

Location			Spaces				Total Occupied Spaces					Thursday 12 November 2020				
Street	**From**	**To**	**<P120**	**P120-240**	**All Day**	**Total**	**6:00**	**10:00**	**11:00**	**12:00**	**13:00**	**14:00**	**15:00**	**16:00**	**17:00**	**18:00**
Hutt Road	Esplanade	Jackson	0	0	153	153		99	100	101	100	99	96	80	51	25
Hutt Road	Jackson	Petone	9	0	32	41		26	31	32	30	33	21	10	4	
Hutt Road	Petone	Udy	1		26	27		32	27	28	27	29	24	24	15	16
Nevis Street	Esplanade	Hutt	32	0	24	56	3	35	36	37	38	20	17	20	29	36
Armidale Street	Esplanade	Lochy	0	0	6	6										
Lochy Street	Armidale	Te Puni	0	0	25	25		21	22	16	13	12	11	4	1	2
Te Puni Street	Esplanade	Lochy	0	0	8	8		2	4	6	2	2	2	6	2	1
Te Puni Street	Lochy	Jackson	14	0	36	50		19	23	15	21	15	12			
Annie Huggan	Te Puni	End	0	0	36	36		32	34	29	29	27	21	15	6	8
Gear Street	Jackson	Petone	0	23	0	23	3	23	25	22	21	19	22	16	11	10
Petone Ave	Hutt	Jackson	0	0	22	22	5	16	15	13	14	13	9	10	10	10
Union Street	Victoria	Sydney	0		11	11	6	12	12	12	11	10	5	8	8	4
Victoria Street	Esplanade	Jackson	0		14	14	2	15	4	5	10	13	9	2	3	3
Victoria Street	Jackson	Regent	0		21	21	12	23	27	27	29	27	28	22	26	34
Fitzherbert Street	Esplanade	Jackson	0	5	0	5	1	5	5	5	5	4	5	3	1	1
Fitzherbert Street	Jackson	Regent	0	5	10	15	6	9	13	14	13	14	13	15	7	11
Sydney Street	Esplanade	Jackson	3	6		9	3	4	5	3	5	4	4	4	5	5
Sydney Street	Jackson	Regent	0	0	14	14	11	13	15	12	12	10	11	14	12	11
Nelson Street	Esplanade	Jackson	0	0	50	50	22	51	49	51	54	43	42	31	33	28
Nelson Street	Jackson	Campbell	0	0	40	40	11	28	35	35	36	31	33	29	23	24
Scholls Lane	Jackson	Campbell	0	0	14	14	2	13	13	13	13	13	9	11	10	10
Richmond Street	Esplanade	Jackson	4	0	53	57	22	32	39	40	43	32	32	33	26	28
Richmond Street	Jackson	Campbell	5	0	10	15	5	10	10	13	12	11	13	11	10	12
Bay Street	Esplanade	Jackson	6		68	74	24	37	45	50	49	43	35	33	28	28
Brittania Street	Jackson	Kirk	25		14	39		23	28	37	34	32	24	19	21	36
Brittania Street	Kirk	Udy	0	0	66	66		29	33	27	27	28	22	19	58	58
Beach Street	King	Jackson	3	0	28	31	6	21	23	21	25	19	16	14	12	11
King Street	Esplanade	Beach	0	0	39	39	6	11	15	12	15	7	8	8	7	8
Queen Street	Esplanade	Jackson	7		77	84	26	37	36	44	43	38	30	30	28	35
Elizabeth Street	Jackson	Kensington	4		50	54	19	37	35	34	33	38	29	40	32	28
Buick Stret West	Esplanade	Jackson	2	0	64	66	21	36	44	40	35	32	29	31	36	35
Buick Stret West	Jackson	Reserve	5	8	25	38	5	24	40	38	33	31	26	23	20	22
Buick Stret East	Esplanade	Jackson	2	0	63	65	19	37	36	46	30	27	18	21	19	22
Buick Stret East	Jackson	Reserve	0		24	24	3	34	32	33	24	26	18	15	10	6
Bolton Street	Esplanade	Jackson	3		70	73	13	17	14	13	12	13	14	14	19	17
Kensington Street	Jackson	Huia	7	0	35	42		46	45	42	36	35		25	58	50
Kensington Street	Huia	Udy	0	0	68	68		67	68	64	61	63	25	42	25	25
Tory Street	Esplanade	Jackson	7	0	41	48	22	20	32	22	13	16	77	20	24	24
Adelaide Street	Buick	Cuba	0	0	47	47	15	18	21	23	17	17	18	18	16	8
Cuba Street	Esplanade	Jackson	4		50	54		38	31	29	24	32	31	30	33	29
The Esplanade	Hutt	Te Puni	0	0	32	32		34	50	29	25	28	30	23	5	2
The Esplanade	Te Puni	Victoria	11	0	27	38		30	32	30	26	34	27	15	19	19
The Esplanade	Victoria	Richmond	0	0	42	42		40	68	45	43	38	33	28	26	31
The Esplanade	Richmond	Beach	0	0	23	23		5	22	17	13	5	5	4	1	3
The Esplanade	Beach	Buick	0	0	14	14		1	3	2	2	2	2	5	3	2
The Esplanade	Buick	Cuba	0	0	22	22		3	1	2	3	2	2	4		5
Jackson Street	Hutt	Gear	44	0	0	44		40	38	43	46	49	37	36	26	18
Jackson Street	Gear	Victoria	11	0	0	11	3	5	7	9	8	9	6	6	8	10
Jackson Street	Victoria	Fiztherbert	19	0	1	20		13	15	18	19	19	14	14	18	17
Jackson Street	Fiztherbert	Sydney	18	0	1	19		16	18	14	18	18	15	11	19	19
Jackson Street	Sydney	Nelson	20	0	0	20		22	19	20	20	18	18	9	20	20
Jackson Street	Nelson	Richmond	26	0	1	27		8	11	19	25	25	16	23	24	26
Jackson Street	Richmond	Britannia	24	0	3	27		21	25	22	26	21	23	20	22	23
Jackson Street	Britannia	Elizabeth	19	0	1	20		14	15	18	17	17	10	20	26	23
Jackson Street	Elizabeth	Buick	19	0	0	19		14	13	19	16	13	10	7	16	16
Jackson Street	Buick	Kensington	20	0	0	20		10	13	19	15	14	12	7	11	12
Jackson Street	Kensington	Tory	22	0	2	24		10	14	21	19	16	11	11	32	32
Jackson Street	Tory	Cuba	14	0	1	15		7	15	15	15	11	10	11	8	11
Peel Place Carpark				57		57		46	54	54	55	31	21	20	13	14
Council / Library Carpark			9			9		5	4	8	7	3	4	3	0	6
Silbery Place Carpark				33		33		10	22	28	20	10	9	20	18	21
Beach Street Carpark				26		26	4	19	19	19	20	16	16	14	12	14
Bay Street Carpark (private)					20	20	0	11	11	15	16	16	12	7	7	7
			1			1										
Jackson Street			256	0	10	266	3	180	203	237	244	230	182	175	230	227
The Esplanade			11	0	160	171	0	113	176	125	112	109	99	79	54	62
Western Petone (commercial streets)			59	39	438	536	52	386	398	377	380	351	310	253	191	177
Central Petone (residential streets)			84	8	996	1088	241	666	724	727	669	627	549	517	548	544
Public Off Street Carparks			9	116	0	125	4	80	99	109	102	60	50	57	43	55
Total Petone On Street			410	47	1604	2061	296	1345	1501	1466	1405	1317	1140	1024	1023	1010
Total Petone			419	163	1604	2186	300	1425	1600	1575	1507	1377	1190	1081	1066	1065

Location			Percent Occupied			Thursday 12 November 2020						Percent Occupied		
Street	From	To	6:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	MAX	Average	Ave 12-16
Hutt Road	Esplanade	Jackson	0%	65%	65%	66%	65%	65%	63%	52%	33%	16%	66%	55%	65%
Hutt Road	Jackson	Petone	0%	63%	76%	78%	73%	80%	51%	24%	10%	0%	80%	51%	71%
Hutt Road	Petone	Udy	0%	119%	100%	104%	100%	107%	89%	89%	56%	59%	119%	91%	100%
Nevis Street	Esplanade	Hutt	5%	63%	64%	66%	68%	36%	30%	36%	52%	64%	68%	53%	50%
Armidale Street	Esplanade	Lochy	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Lochy Street	Armidale	Te Puni	0%	84%	88%	64%	52%	48%	44%	16%	4%	8%	88%	45%	52%
Te Puni Street	Esplanade	Lochy	0%	25%	50%	75%	25%	25%	25%	75%	25%	13%	75%	38%	38%
Te Puni Street	Lochy	Jackson	0%	38%	46%	30%	42%	30%	24%	0%	0%	0%	46%	23%	32%
Annie Huggan	Te Puni	End	0%	89%	94%	81%	81%	75%	58%	42%	17%	22%	94%	62%	74%
Gear Street	Jackson	Petone	13%	100%	109%	96%	91%	83%	96%	70%	48%	43%	109%	82%	91%
Petone Ave	Hutt	Jackson	23%	73%	68%	59%	64%	59%	41%	45%	45%	45%	73%	56%	56%
Union Street	Victoria	Sydney	55%	109%	109%	109%	100%	91%	45%	73%	73%	36%	109%	83%	86%
Victoria Street	Esplanade	Jackson	14%	107%	29%	36%	71%	93%	64%	14%	21%	21%	107%	51%	66%
Victoria Street	Jackson	Regent	57%	110%	129%	129%	138%	129%	133%	105%	124%	162%	162%	129%	132%
Fitzherbert Street	Esplanade	Jackson	20%	100%	100%	100%	100%	80%	100%	60%	20%	20%	100%	76%	95%
Fitzherbert Street	Jackson	Regent	40%	60%	87%	93%	87%	93%	87%	100%	47%	73%	100%	81%	90%
Sydney Street	Esplanade	Jackson	33%	44%	56%	33%	56%	44%	44%	44%	56%	56%	56%	48%	44%
Sydney Street	Jackson	Regent	79%	93%	107%	86%	86%	71%	79%	100%	86%	79%	107%	87%	80%
Nelson Street	Esplanade	Jackson	44%	102%	98%	102%	108%	86%	84%	62%	66%	56%	108%	85%	95%
Nelson Street	Jackson	Campbell	28%	70%	88%	88%	90%	78%	83%	73%	58%	60%	90%	76%	84%
Scholls Lane	Jackson	Campbell	14%	93%	93%	93%	93%	93%	64%	79%	71%	71%	93%	83%	86%
Richmond Street	Esplanade	Jackson	39%	56%	68%	70%	75%	56%	56%	58%	46%	49%	75%	59%	64%
Richmond Street	Jackson	Campbell	33%	67%	67%	87%	80%	73%	87%	73%	67%	80%	87%	76%	82%
Bay Street	Esplanade	Jackson	32%	50%	61%	68%	66%	58%	47%	45%	38%	38%	68%	52%	60%
Brittania Street	Jackson	Kirk	0%	59%	72%	95%	87%	82%	62%	49%	54%	92%	95%	72%	81%
Brittania Street	Kirk	Udy	0%	44%	50%	41%	41%	42%	33%	29%	88%	88%	88%	51%	39%
Beach Street	King	Jackson	19%	68%	74%	68%	81%	61%	52%	45%	39%	35%	81%	58%	65%
King Street	Esplanade	Beach	15%	28%	38%	31%	38%	18%	21%	21%	18%	21%	38%	26%	27%
Queen Street	Esplanade	Jackson	31%	44%	43%	52%	51%	45%	36%	36%	33%	42%	52%	42%	46%
Elizabeth Street	Jackson	Kensington	35%	69%	65%	63%	61%	70%	54%	74%	59%	52%	74%	63%	62%
Buick Stret West	Esplanade	Jackson	32%	55%	67%	61%	53%	48%	44%	47%	55%	53%	67%	54%	52%
Buick Stret West	Jackson	Reserve	13%	63%	105%	100%	87%	82%	68%	61%	53%	58%	105%	75%	84%
Buick Stret East	Esplanade	Jackson	29%	57%	55%	71%	46%	42%	28%	32%	29%	34%	71%	44%	47%
Buick Stret East	Jackson	Reserve	13%	142%	133%	138%	100%	108%	75%	63%	42%	25%	142%	92%	105%
Bolton Street	Esplanade	Jackson	18%	23%	19%	18%	16%	18%	19%	19%	26%	23%	26%	20%	18%
Kensington Street	Jackson	Huia	0%	110%	107%	100%	86%	83%	0%	60%	138%	119%	138%	89%	67%
Kensington Street	Huia	Udy	0%	99%	100%	94%	90%	93%	37%	62%	37%	37%	100%	72%	78%
Tory Street	Esplanade	Jackson	46%	42%	67%	46%	27%	33%	160%	42%	50%	50%	160%	57%	67%
Adelaide Street	Buick	Cuba	32%	38%	45%	49%	36%	36%	38%	38%	34%	17%	49%	37%	40%
Cuba Street	Esplanade	Jackson	0%	70%	57%	54%	44%	59%	57%	56%	61%	54%	70%	57%	54%
The Esplanade	Hutt	Te Puni	0%	106%	156%	91%	78%	88%	94%	72%	16%	6%	156%	78%	88%
The Esplanade	Te Puni	Victoria	0%	79%	84%	79%	68%	89%	71%	39%	50%	50%	89%	68%	77%
The Esplanade	Victoria	Richmond	0%	95%	162%	107%	102%	90%	79%	67%	62%	74%	162%	93%	95%
The Esplanade	Richmond	Beach	0%	22%	96%	74%	57%	22%	22%	17%	4%	13%	96%	36%	43%
The Esplanade	Beach	Buick	0%	7%	21%	14%	14%	14%	14%	36%	21%	14%	36%	17%	14%
The Esplanade	Buick	Cuba	0%	14%	5%	9%	14%	9%	9%	18%	0%	23%	23%	11%	10%
Jackson Street	Hutt	Gear	0%	91%	86%	98%	105%	111%	84%	82%	59%	41%	111%	84%	99%
Jackson Street	Gear	Victoria	27%	45%	64%	82%	73%	82%	55%	55%	73%	91%	91%	69%	73%
Jackson Street	Victoria	Fiztherbert	0%	65%	75%	90%	95%	95%	70%	70%	90%	85%	95%	82%	88%
Jackson Street	Fiztherbert	Sydney	0%	84%	95%	74%	95%	95%	79%	58%	100%	100%	100%	87%	86%
Jackson Street	Sydney	Nelson	0%	110%	95%	100%	100%	90%	90%	45%	100%	100%	110%	92%	95%
Jackson Street	Nelson	Richmond	0%	30%	41%	70%	93%	93%	59%	85%	89%	96%	96%	73%	79%
Jackson Street	Richmond	Britannia	0%	78%	93%	81%	96%	78%	85%	74%	81%	85%	96%	84%	85%
Jackson Street	Britannia	Elizabeth	0%	70%	75%	90%	85%	85%	50%	100%	130%	115%	130%	89%	78%
Jackson Street	Elizabeth	Buick	0%	74%	68%	100%	84%	68%	53%	37%	84%	84%	100%	73%	76%
Jackson Street	Buick	Kensington	0%	50%	65%	95%	75%	70%	60%	35%	55%	60%	95%	63%	75%
Jackson Street	Kensington	Tory	0%	42%	58%	88%	79%	67%	46%	46%	133%	133%	133%	77%	70%
Jackson Street	Tory	Cuba	0%	47%	100%	100%	100%	73%	67%	73%	53%	73%	100%	76%	85%
Peel Place Carpark			0%	81%	95%	95%	96%	54%	37%	35%	23%	25%	96%	60%	71%
Council / Library Carpark			0%	56%	44%	89%	78%	33%	44%	33%	0%	67%	89%	49%	61%
Silbery Place Carpark			0%	30%	67%	85%	61%	30%	27%	61%	55%	64%	85%	53%	51%
Beach Street Carpark			15%	73%	73%	73%	77%	62%	62%	54%	46%	54%	77%	64%	68%
Bay Street Carpark (private)			0%	55%	55%	75%	80%	80%	60%	35%	35%	35%	80%	57%	74%

Jackson Street	1%	68%	76%	89%	92%	86%	68%	66%	86%	85%	92%	80%	84%
The Esplanade	0%	66%	103%	73%	65%	64%	58%	46%	32%	36%	103%	60%	65%
Western Petone (commercial streets)	10%	72%	74%	70%	71%	65%	58%	47%	36%	33%	74%	59%	66%
Central Petone (residential streets)	22%	61%	67%	67%	61%	58%	50%	48%	50%	50%	67%	57%	59%
Public Off Street Carparks	3%	64%	79%	87%	82%	48%	40%	46%	34%	44%	87%	58%	64%
Total Petone On Street	14%	65%	73%	71%	68%	64%	55%	50%	50%	49%	73%	61%	65%
Total Petone	14%	65%	73%	72%	69%	63%	54%	49%	49%	49%	73%	60%	65%

Location			Spaces					Total Occupied Spaces				Saturday 7 November 2020				
Street	From	To	<P120	P120-240	All Day	Total	6:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Hutt Road	Esplanade	Jackson	0	0	153	153		34	46	42	49	38	28	28	27	18
Hutt Road	Jackson	Petone	9	0	32	41		6	9	14	8	8				
Hutt Road	Petone	Udy	1	0	26	27		12	20	17	14	15	14	15	9	12
Nevis Street	Esplanade	Hutt	32	0	24	56		27	38	25	24	13	14	26	37	19
Armidale Street	Esplanade	Lochy	0	0	6	6			3							
Lochy Street	Armidale	Te Puni	0	0	25	25		14	20	10	11	3	5	2		
Te Puni Street	Esplanade	Lochy	0	0	8	8		5	8				3			
Te Puni Street	Lochy	Jackson	14	0	36	50		6	14	9	18	13	10	6	2	
Annie Huggan	Te Puni	End	0	0	36	36		11	16	13	15	13	10	6	5	5
Gear Street	Jackson	Petone	0	23	0	23		14	14	16	16	16	10	10	7	8
Petone Ave	Hutt	Jackson	0	0	22	22		5	9	9	10	5	9	8	9	10
Union Street	Victoria	Sydney	0	0	11	11		8	8	10	11	5	7	4	4	4
Victoria Street	Esplanade	Jackson	0	0	14	14		7	7	6	5	5	5	7	3	3
Victoria Street	Jackson	Regent	0	0	21	21		18	29	25	29	19	25	25	32	36
Fitzherbert Street	Esplanade	Jackson	0	5	0	5		3	5	4	1	4	3	3	3	3
Fitzherbert Street	Jackson	Regent	0	5	10	15		10	14	16	16	11	12	11	8	11
Sydney Street	Esplanade	Jackson	3	6	0	9		6	8	7	3	3	5	5	3	4
Sydney Street	Jackson	Regent	0	0	14	14		13	14	17	17	16	17	11	14	16
Nelson Street	Esplanade	Jackson	0	0	50	50	27	48	86	46	47	43	44	56	36	36
Nelson Street	Jackson	Campbell	0	0	40	40	11	35	6	33	30	34	26	3	17	26
Scholls Lane	Jackson	Campbell	0	0	14	14	8	12	15	13	13	15	15	13	13	11
Richmond Street	Esplanade	Jackson	4	0	53	57	31	39	44	37	35	31	36	29	31	32
Richmond Street	Jackson	Campbell	5	0	10	15	7	11	11	12	13	11	10	10	9	12
Bay Street	Esplanade	Jackson	6	0	68	74	25	37	39	40	34	36	30	33	26	27
Brittania Street	Jackson	Kirk	25	0	14	39	18	26	33	37	33	37	20	20	21	15
Brittania Street	Kirk	Udy	0	0	66	66	15	9	9	10	19	10	18	18	5	13
Beach Street	King	Jackson	3	0	28	31	6	27	28	24	22	27	26	22	19	26
King Street	Esplanade	Beach	0	0	39	39	14	23	25	20	17	14	23	19	20	24
Queen Street	Esplanade	Jackson	7	0	77	84	54	35	45	44	46	27	43	31	31	38
Elizabeth Street	Jackson	Kensington	4	0	50	54	42	38	37	45	37	29	37	34	30	29
Buick Stret West	Esplanade	Jackson	2	0	64	66	18	46		52	50	27	35	37	34	35
Buick Stret West	Jackson	Reserve	5	8	25	38	8	25	51	29	24	13	16	12	14	13
Buick Stret East	Esplanade	Jackson	2	0	63	65	20	40	78	47	36	22	27	31	40	44
Buick Stret East	Jackson	Reserve	0	0	24	24	4	16	18	13	12	10	8	11	11	13
Bolton Street	Esplanade	Jackson	3	0	70	73	44	16	17	23	21	18	19	20	20	19
Kensington Street	Jackson	Huia	7	0	35	42	21	25	28	33	28	33	27	25	30	33
Kensington Street	Huia	Udy	0	0	68	68	13	38	47	23	31	23	20	20	23	21
Tory Street	Esplanade	Jackson	7	0	41	48	28	18	18	22	20	20	22	14	25	18
Adelaide Street	Buick	Cuba	0	0	47	47	32	21	28	28	23	17	21	20	19	17
Cuba Street	Esplanade	Jackson	4	0	50	54	28	27	33	16	36	16	27	27	29	30
The Esplanade	Hutt	Te Puni	0	0	32	32		5	11	10	14	10	5	8	3	6
The Esplanade	Te Puni	Victoria	11	0	27	38		2			1		1	2	1	1
The Esplanade	Victoria	Richmond	0	0	42	42	0	35	39	39	32	38	18	26	11	27
The Esplanade	Richmond	Beach	0	0	23	23	0	11	10	10	9	7	2	3	1	2
The Esplanade	Beach	Buick	0	0	14	14		2	2	3	1	2	3	5	1	
The Esplanade	Buick	Cuba	0	0	22	22		4	9	3	3	3	3	7	4	6
Jackson Street	Hutt	Gear	44	0	0	44		28	26	30	31	29	13	13	6	9
Jackson Street	Gear	Victoria	11	0	0	11		6	10	7	8	6	8	8	11	10
Jackson Street	Victoria	Fiztherbert	19	0	1	20	11	18	17	17	18	19	18	18	19	22
Jackson Street	Fiztherbert	Sydney	18	0	1	19		19	18	21	18	19	12	12	17	16
Jackson Street	Sydney	Nelson	20	0	0	20	3	18	20	23	17	24	14	14	20	18
Jackson Street	Nelson	Richmond	26	0	1	27		25	26	26	25	27	22	22	25	31
Jackson Street	Richmond	Britannia	24	0	3	27	3	28	27	28	23	26	19	20	23	28
Jackson Street	Britannia	Elizabeth	19	0	1	20		16	20	16	19	17	14	14	16	17
Jackson Street	Elizabeth	Buick	19	0	0	19	7	15	22	18	16	15	14	13	17	12
Jackson Street	Buick	Kensington	20	0	0	20		18	19	19	18	16	12	12	17	19
Jackson Street	Kensington	Tory	22	0	2	24		20	23	21	22	22	18	19	21	34
Jackson Street	Tory	Cuba	14	0	1	15		12	13	13	15	12	5	5	8	12
Peel Place Carpark			0	57	0	57	9	48	53	53	51	48	44	41	31	33
Council / Library Carpark			9	0	0	9	0	7	7	7	9	7	1	1	1	6
Silbery Place Carpark			0	33	0	33	1	21	25	30	31	33	27	28	12	9
Beach Street Carpark			0	26	0	26	2	21	21	18	23	21	21	21	18	17
Bay Street Carpark (private)			0	0	20	20	0	9	8	8	14	11	5	5	3	3
			1			1										
Jackson Street			256	0	10	266	24	223	241	239	230	232	169	170	200	228
The Esplanade			11	0	160	171	0	59	71	65	60	60	32	51	21	42
Western Petone (commercial streets)			59	39	438	536	0	199	282	240	247	187	177	167	163	149
Central Petone (residential streets)			84	8	996	1088	474	612	696	647	627	513	550	505	503	532
Petone Public Off Street Carparks			9	116	0	125	12	97	106	108	114	109	93	91	62	65
Total Petone On Street			410	47	1604	2061	498	1093	1290	1191	1164	992	928	893	887	951
Total			419	163	1604	2186	510	1190	1396	1299	1278	1101	1021	984	949	1016

Location				Percent Occupied			Saturday 7 November 2020						Percent Occupied		
Street	From	To	6:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	MAX	Average	Ave 12-16
Hutt Road	Esplanade	Jackson	0%	22%	30%	27%	32%	25%	18%	18%	18%	12%	32%	23%	26%
Hutt Road	Jackson	Petone	0%	15%	22%	34%	20%	20%	0%	0%	0%	0%	34%	12%	18%
Hutt Road	Petone	Udy	0%	44%	74%	63%	52%	56%	52%	56%	33%	44%	74%	53%	56%
Nevis Street	Esplanade	Hutt	0%	48%	68%	45%	43%	23%	25%	46%	66%	34%	68%	44%	34%
Armidale Street	Esplanade	Lochy	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	50%	6%	0%
Lochy Street	Armidale	Te Puni	0%	56%	80%	40%	44%	12%	20%	8%	0%	0%	80%	29%	29%
Te Puni Street	Esplanade	Lochy	0%	63%	100%	0%	0%	0%	38%	0%	0%	0%	100%	22%	9%
Te Puni Street	Lochy	Jackson	0%	12%	28%	18%	36%	26%	20%	12%	4%	0%	36%	17%	25%
Annie Huggan	Te Puni	End	0%	31%	44%	36%	42%	36%	28%	17%	14%	14%	44%	29%	35%
Gear Street	Jackson	Petone	0%	61%	61%	70%	70%	70%	43%	43%	30%	35%	70%	54%	63%
Petone Ave	Hutt	Jackson	0%	23%	41%	41%	45%	23%	41%	36%	41%	45%	45%	37%	38%
Union Street	Victoria	Sydney	0%	73%	73%	91%	100%	45%	64%	36%	36%	36%	100%	62%	75%
Victoria Street	Esplanade	Jackson	0%	50%	50%	43%	36%	36%	36%	50%	21%	21%	50%	38%	38%
Victoria Street	Jackson	Regent	0%	86%	138%	119%	138%	90%	119%	119%	152%	171%	171%	126%	117%
Fitzherbert Street	Esplanade	Jackson	0%	60%	100%	80%	20%	80%	60%	60%	60%	60%	100%	64%	60%
Fitzherbert Street	Jackson	Regent	0%	67%	93%	107%	107%	73%	80%	73%	53%	73%	107%	81%	92%
Sydney Street	Esplanade	Jackson	0%	67%	89%	78%	33%	33%	56%	56%	33%	44%	89%	54%	50%
Sydney Street	Jackson	Regent	0%	93%	100%	121%	121%	114%	121%	79%	100%	114%	121%	107%	120%
Nelson Street	Esplanade	Jackson	54%	96%	172%	92%	94%	86%	88%	112%	72%	72%	172%	98%	90%
Nelson Street	Jackson	Campbell	28%	88%	15%	83%	75%	85%	65%	8%	43%	65%	88%	58%	77%
Scholls Lane	Jackson	Campbell	57%	86%	107%	93%	93%	107%	107%	93%	93%	79%	107%	95%	100%
Richmond Street	Esplanade	Jackson	54%	68%	77%	65%	61%	54%	63%	51%	54%	56%	77%	61%	61%
Richmond Street	Jackson	Campbell	47%	73%	73%	80%	87%	73%	67%	67%	60%	80%	87%	73%	77%
Bay Street	Esplanade	Jackson	34%	50%	53%	54%	46%	49%	41%	45%	35%	36%	54%	45%	47%
Brittania Street	Jackson	Kirk	46%	67%	85%	95%	85%	95%	51%	51%	54%	38%	95%	69%	81%
Brittania Street	Kirk	Udy	23%	14%	14%	15%	29%	15%	27%	27%	8%	20%	29%	19%	22%
Beach Street	King	Jackson	19%	87%	90%	77%	71%	87%	84%	71%	61%	84%	90%	79%	80%
King Street	Esplanade	Beach	36%	59%	64%	51%	44%	36%	59%	49%	51%	62%	64%	53%	47%
Queen Street	Esplanade	Jackson	64%	42%	54%	52%	55%	32%	51%	37%	37%	45%	55%	45%	48%
Elizabeth Street	Jackson	Kensington	78%	70%	69%	83%	69%	54%	69%	63%	56%	54%	83%	65%	69%
Buick Stret West	Esplanade	Jackson	27%	70%	0%	79%	76%	41%	53%	56%	52%	53%	79%	53%	62%
Buick Stret West	Jackson	Reserve	21%	66%	134%	76%	63%	34%	42%	32%	37%	34%	134%	58%	54%
Buick Stret East	Esplanade	Jackson	31%	62%	120%	72%	55%	34%	42%	48%	62%	68%	120%	62%	51%
Buick Stret East	Jackson	Reserve	17%	67%	75%	54%	50%	42%	33%	46%	46%	54%	75%	52%	45%
Bolton Street	Esplanade	Jackson	60%	22%	23%	32%	29%	25%	26%	27%	27%	26%	32%	26%	28%
Kensington Street	Jackson	Huia	50%	60%	67%	79%	67%	79%	64%	60%	71%	79%	79%	69%	72%
Kensington Street	Huia	Udy	19%	56%	69%	34%	46%	34%	29%	29%	34%	31%	69%	40%	36%
Tory Street	Esplanade	Jackson	58%	38%	38%	46%	42%	42%	46%	29%	52%	38%	52%	41%	44%
Adelaide Street	Buick	Cuba	68%	45%	60%	60%	49%	36%	45%	43%	40%	36%	60%	46%	47%
Cuba Street	Esplanade	Jackson	52%	50%	61%	30%	67%	30%	50%	50%	54%	56%	67%	50%	44%
The Esplanade	Hutt	Te Puni	0%	16%	34%	31%	44%	31%	16%	25%	9%	19%	44%	25%	30%
The Esplanade	Te Puni	Victoria	0%	5%	0%	0%	3%	0%	3%	5%	3%	3%	5%	2%	1%
The Esplanade	Victoria	Richmond	0%	83%	93%	93%	76%	90%	43%	62%	26%	64%	93%	70%	76%
The Esplanade	Richmond	Beach	0%	48%	43%	43%	39%	30%	9%	13%	4%	9%	48%	27%	30%
The Esplanade	Beach	Buick	0%	14%	14%	21%	7%	14%	21%	36%	7%	0%	36%	15%	16%
The Esplanade	Buick	Cuba	0%	18%	41%	14%	14%	14%	14%	32%	18%	27%	41%	21%	14%
Jackson Street	Hutt	Gear	0%	64%	59%	68%	70%	66%	30%	30%	14%	20%	70%	47%	59%
Jackson Street	Gear	Victoria	0%	55%	91%	64%	73%	55%	73%	73%	100%	91%	100%	75%	66%
Jackson Street	Victoria	Fiztherbert	55%	90%	85%	85%	90%	95%	90%	90%	95%	110%	110%	92%	90%
Jackson Street	Fiztherbert	Sydney	0%	100%	95%	111%	95%	100%	63%	63%	89%	84%	111%	89%	92%
Jackson Street	Sydney	Nelson	15%	90%	100%	115%	85%	120%	70%	70%	100%	90%	120%	93%	98%
Jackson Street	Nelson	Richmond	0%	93%	96%	96%	93%	100%	81%	81%	93%	115%	115%	94%	93%
Jackson Street	Richmond	Britannia	11%	104%	100%	104%	85%	96%	70%	74%	85%	104%	104%	91%	89%
Jackson Street	Britannia	Elizabeth	0%	80%	100%	80%	95%	85%	70%	70%	80%	85%	100%	83%	83%
Jackson Street	Elizabeth	Buick	37%	79%	116%	95%	84%	79%	74%	68%	89%	63%	116%	83%	83%
Jackson Street	Buick	Kensington	0%	90%	95%	95%	90%	80%	60%	60%	85%	95%	95%	83%	81%
Jackson Street	Kensington	Tory	0%	83%	96%	88%	92%	92%	75%	79%	88%	142%	142%	93%	86%
Jackson Street	Tory	Cuba	0%	80%	87%	87%	100%	80%	33%	33%	53%	80%	100%	70%	75%
Peel Place Carpark			16%	84%	93%	93%	89%	84%	77%	72%	54%	58%	93%	78%	86%
Council / Library Carpark			0%	78%	78%	78%	100%	78%	11%	11%	11%	67%	100%	57%	67%
Silbery Place Carpark			3%	64%	76%	91%	94%	100%	82%	85%	36%	27%	100%	73%	92%
Beach Street Carpark			8%	81%	81%	69%	88%	81%	81%	81%	69%	65%	88%	77%	80%
Bay Street Carpark (private)			0%	45%	40%	40%	70%	55%	25%	25%	15%	15%	70%	37%	48%
Jackson Street			9%	84%	91%	90%	86%	87%	64%	64%	75%	86%	91%	81%	82%
The Esplanade			0%	35%	42%	38%	35%	35%	19%	30%	12%	25%	42%	30%	32%
Western Petone (commercial streets)			0%	37%	53%	45%	46%	35%	33%	31%	30%	28%	53%	38%	40%
Central Petone (residential streets)			44%	56%	64%	59%	58%	47%	51%	46%	46%	49%	64%	53%	54%
Petone Public Off Street Carparks			10%	78%	85%	86%	91%	87%	74%	73%	50%	52%	91%	75%	85%
Total Petone On Street			24%	53%	63%	58%	56%	48%	45%	43%	43%	46%	63%	51%	52%
Total			23%	54%	64%	59%	58%	50%	47%	45%	43%	46%	64%	52%	54%

Appendix E – Petone One-off Occupancy Surveys

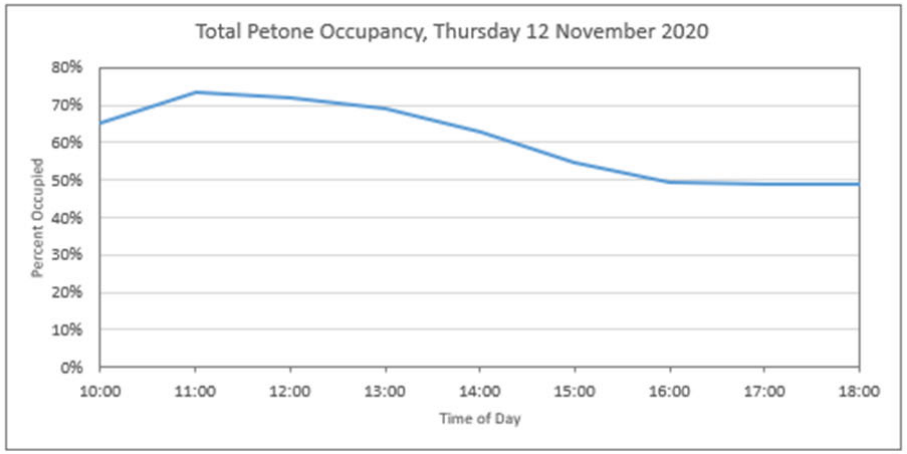
Location	Weekday		Spaces				19/11/20							12/11/20			
Street	From	To	<P120	P120-240	All Day	Total	6:00	8:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Victoria Street	Ewen Bridge	Te Mome		2	15	17		14	16					15			
Victoria Street	Te Mome	Alice	3		17	20			12					16			
Victoria Street	Alice	Valentine			23	23			14					8			
Victoria Street	Valentine	Montague	7			7			4					2			
Cuba Street	Montague	Central Tce	12		11	23			13					13			
Cuba Street west	Central Tce	Wakefield			6	6			7					5			
Cuba Street west	Wakefield	Burnham			17	17								12			
Cuba Street	Burnham	Udy Street			42	42			19					11			
Cuba Street	Udy Street	High Street	2		19	21			10					7			
Cuba Street	High Street	Huia Street	4		19	23			17					12			
Cuba Street	Huia Street	Jackson	5		16	21			19					13			
Burnham Street	Cuba St	End	6		12	18								6			
Udy Street	Cuba St	Kensington			34	34								9			
High Street	Cuba St	William		43		43								28			
Huia Street	Cuba St	Kensington			37	37								28			
Heretaunga Street	Cuba St	William			47	47								28			
Honiana Te Puni Reserve		5-Mar-20			100	100	6	7	16	32	38	47		36	29		15
Petone Wharf Carpark		5-Mar-20	19		21	40	3	24	47	58	66	53		49	43		11

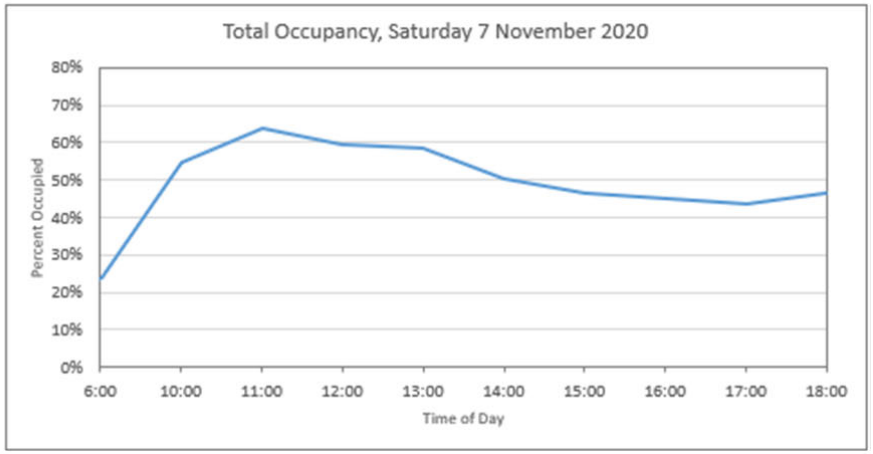
Location	Saturday November		Spaces				14/11/20										
Street	From	To	<P120	P120-240	All Day	Total	6:00	8:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Kirks Avenue	Britannia	end			6	6	6										
Atiawa Street	Kensington	Cuba			24	24	6										
Huia Street	Kensington	Cuba			37	37	10										
Udy Street	Cuba	Kensington			34	34	11										
Udy Street	Kensington	Britannia			49	49	0										
Udy Street	Britannia	Nelson			34	34	5										
Honiana Te Puni Reserve		7-Mar-20			100	100		46			84		63			75	
Petone Wharf Carpark		7-Mar-20	19		21	40		7			45		38			45	

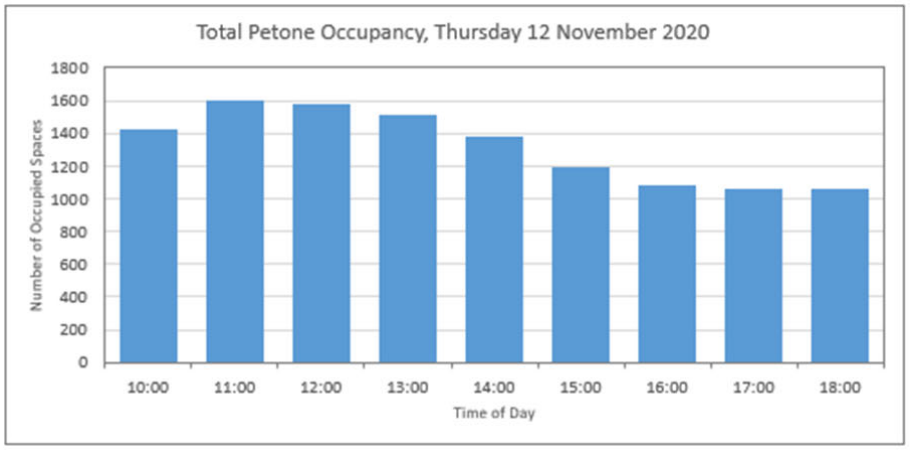
Location	Weekday		Percent Occupied Weekday										Percent Occupied		
Street	From	To	6:00	8:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	MAX	Average	Ave 12-16
Victoria Street	Ewen Bridge	Te Mome		82%	94%					88%				94%	91%	88%
Victoria Street	Te Mome	Alice			60%					80%				80%	70%	80%
Victoria Street	Alice	Valentine			61%					35%				61%	48%	35%
Victoria Street	Valentine	Montague			57%					29%				57%	43%	29%
Cuba Street	Montague	Central Tce			57%					57%				57%	57%	57%
Cuba Street west	Central Tce	Wakefield			117%					83%				117%	100%	83%
Cuba Street west	Wakefield	Burnham								71%				71%	71%	71%
Cuba Street	Burnham	Udy Street			45%					26%				45%	36%	26%
Cuba Street	Udy Street	High Street			48%					33%				48%	40%	33%
Cuba Street	High Street	Huia Street			74%					52%				74%	63%	52%
Cuba Street	Huia Street	Jackson			90%					62%				90%	76%	62%
Burnham Street	Cuba St	End								33%				33%	33%	33%
Udy Street	Cuba St	Kensington								26%				26%	26%	26%
High Street	Cuba St	William								65%				65%	65%	65%
Huia Street	Cuba St	Kensington								76%				76%	76%	76%
Heretaunga Street	Cuba St	William								60%				60%	60%	60%
Honiana Te Puni Reserve			6%	7%	16%	32%	38%	47%		36%	29%		15%	47%	30%	40%
Petone Wharf Carpark			8%	60%	118%	145%	165%	133%		123%	108%		28%	165%	117%	140%

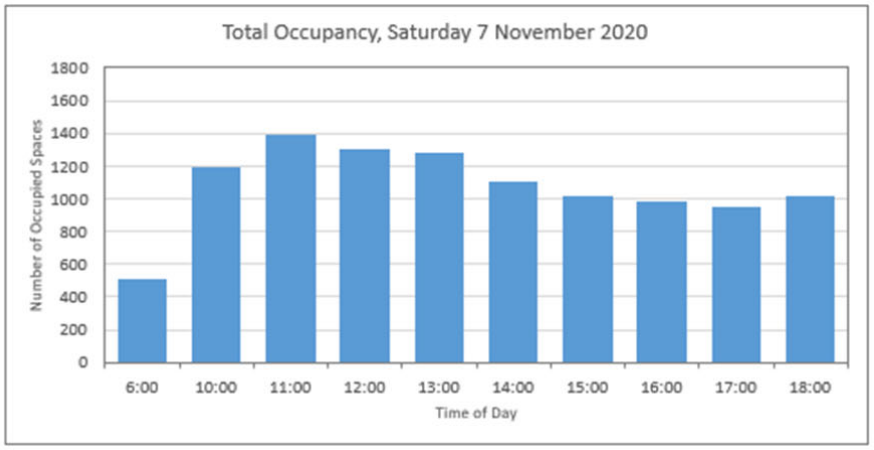
Location					Percent Occupied Saturday November									Percent Occupied		
Street	From	To	6:00	8:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	MAX	Average	Ave 12-16
Kirks Avenue	Britannia	end	100%													
Atiawa Street	Kensington	Cuba	25%													
Huia Street	Kensington	Cuba	27%													
Udy Street	Cuba	Kensington	32%													
Udy Street	Kensington	Britannia	0%													
Udy Street	Britannia	Nelson	15%													
Honiana Te Puni Reserve			0%	46%			84%		63%			75%		84%	74%	74%
Petone Wharf Carpark			0%	18%			113%		95%			113%		113%	107%	104%

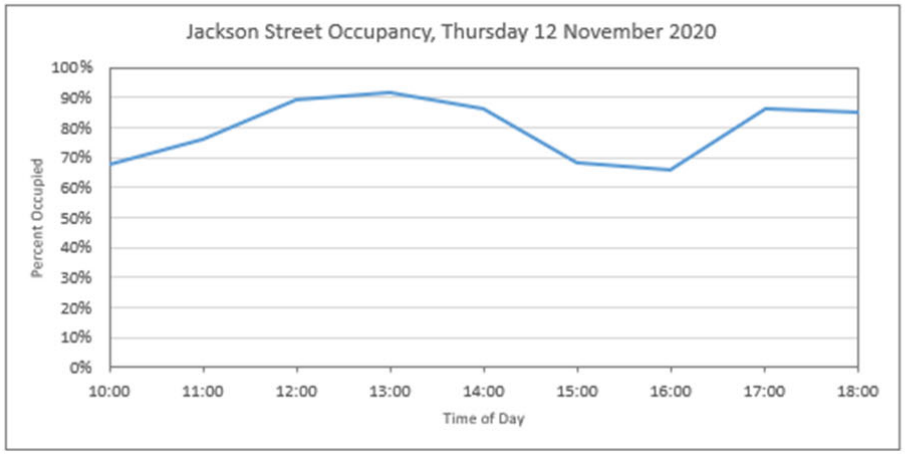
Appendix D – Petone Occupancy – Graphs

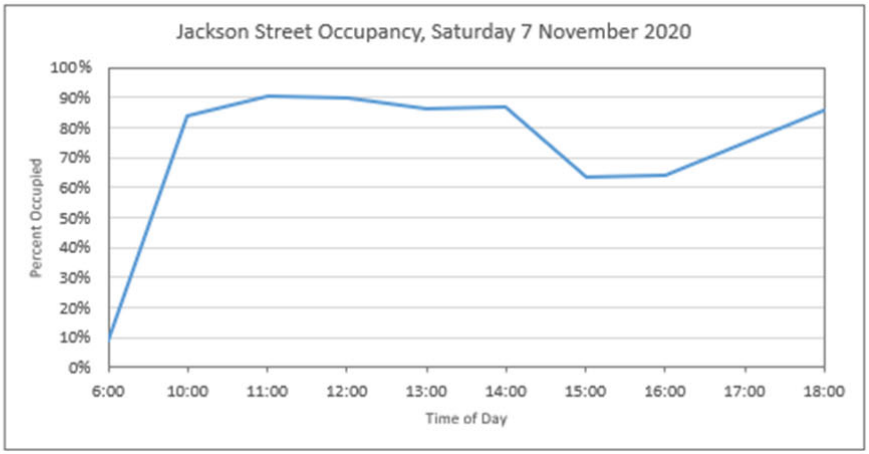


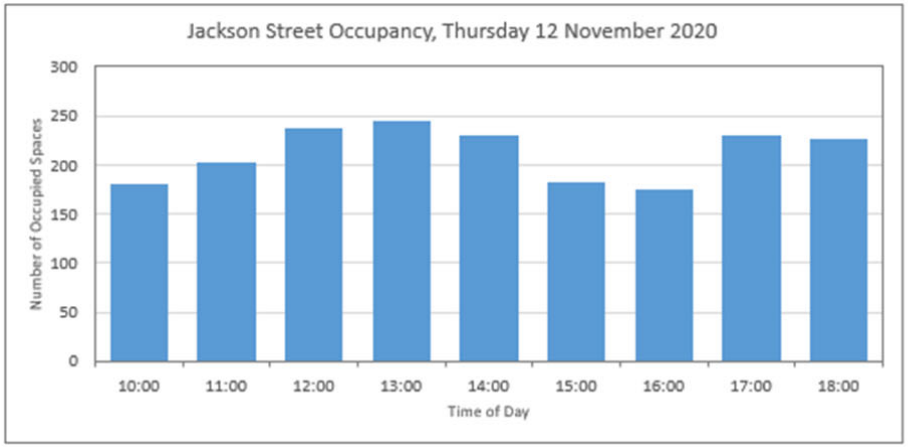


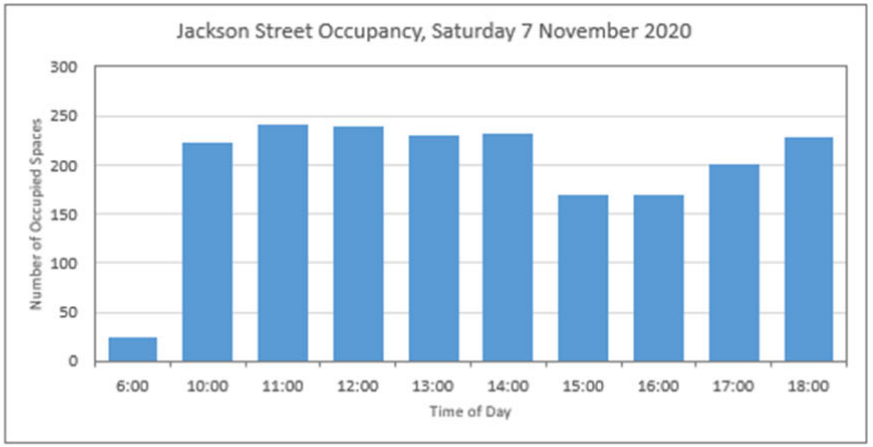


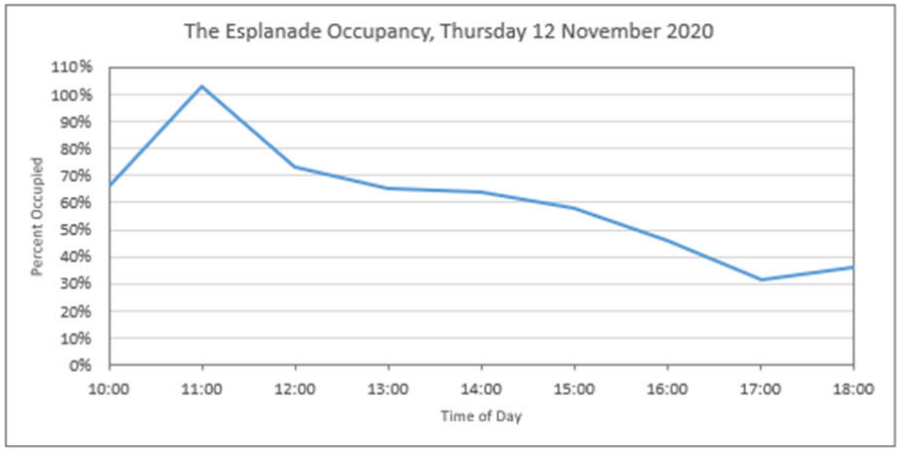


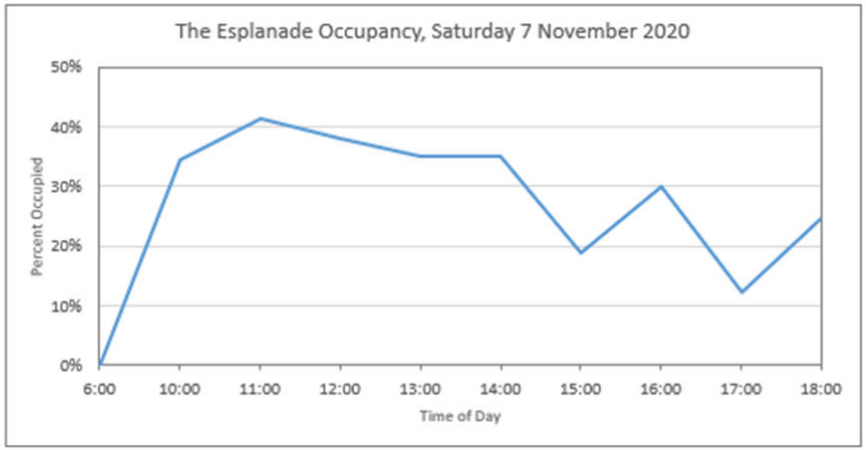

Jackson Street Occupancy, Thursday 12 November 2020
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

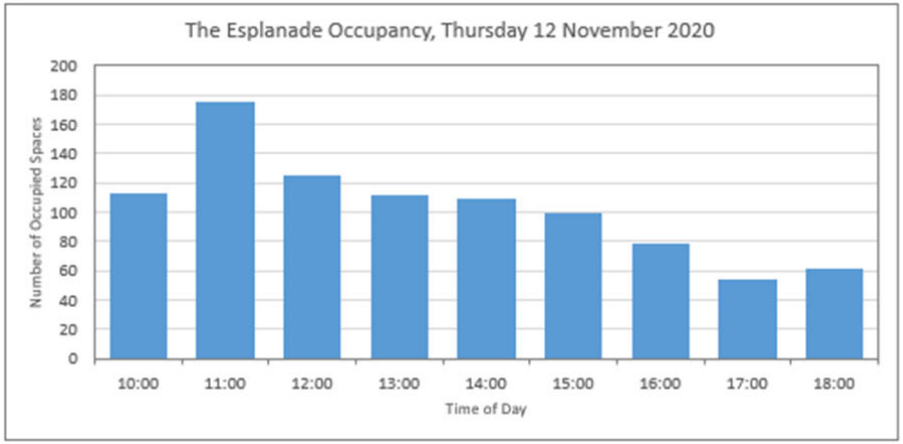

Jackson Street Occupancy, Saturday 7 November 2020
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
6:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

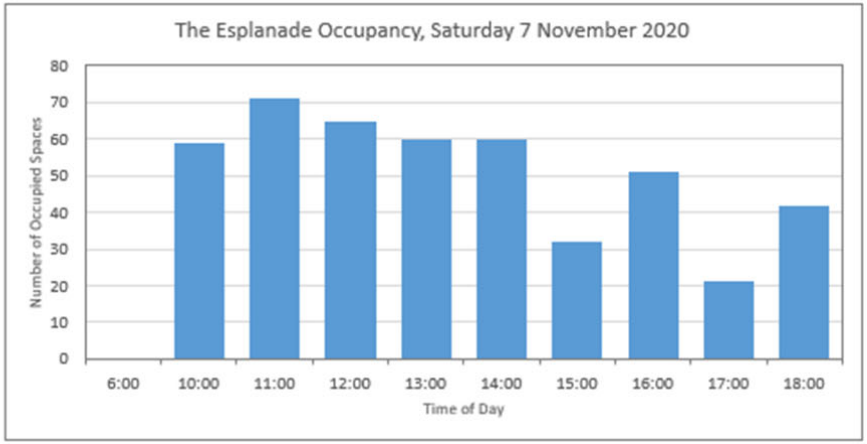

Jackson Street Occupancy, Thursday 12 November 2020
Number of Occupied Spaces
300
250
200
150
100
50
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

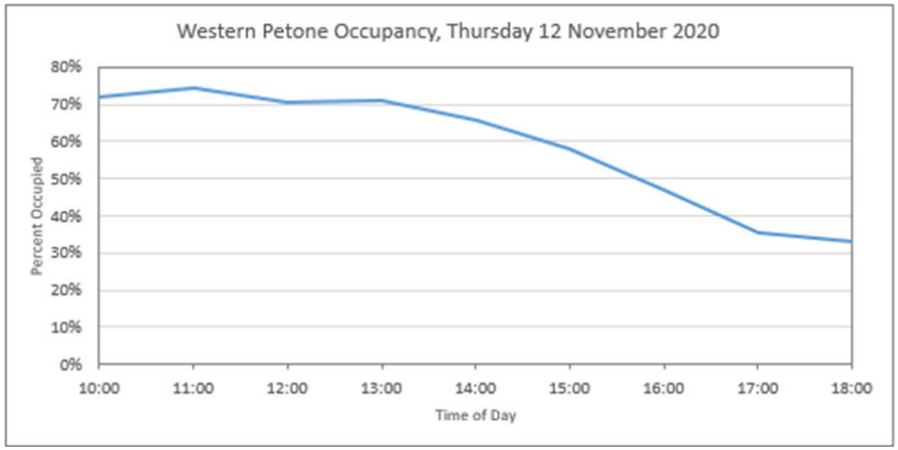

Jackson Street Occupancy, Saturday 7 November 2020
Number of Occupied Spaces
300
250
200
150
100
50
0
6:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

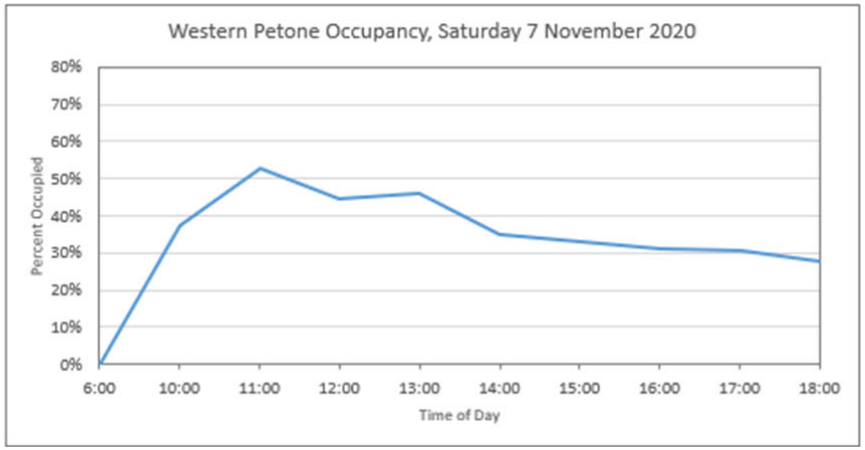

The Esplanade Occupancy, Thursday 12 November 2020
Percent Occupied
110%
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

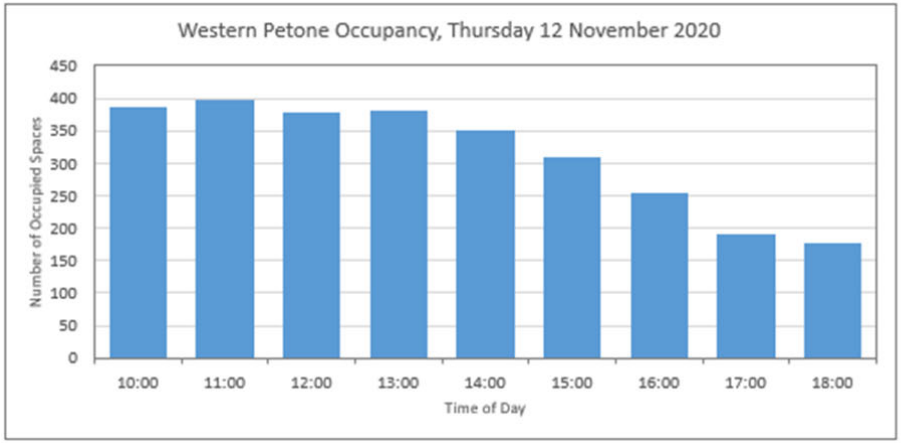

The Esplanade Occupancy, Saturday 7 November 2020
Percent Occupied
50%
40%
30%
20%
10%
0%
6:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

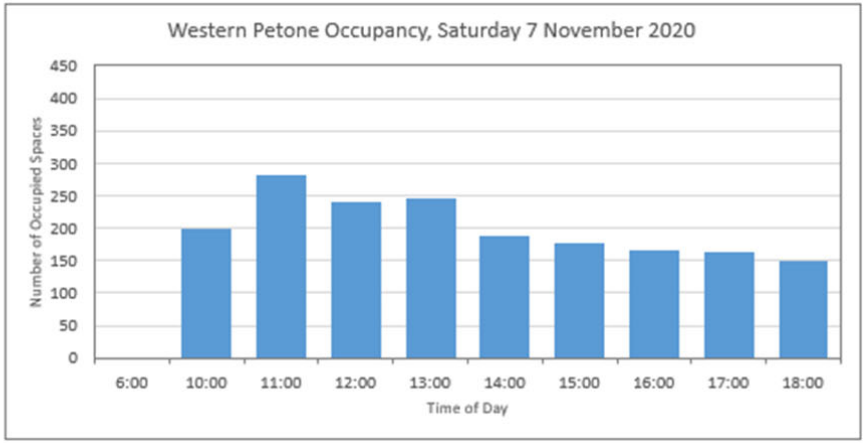

The Esplanade Occupancy, Thursday 12 November 2020
Number of Occupied Spaces
200
180
160
140
120
100
80
60
40
20
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

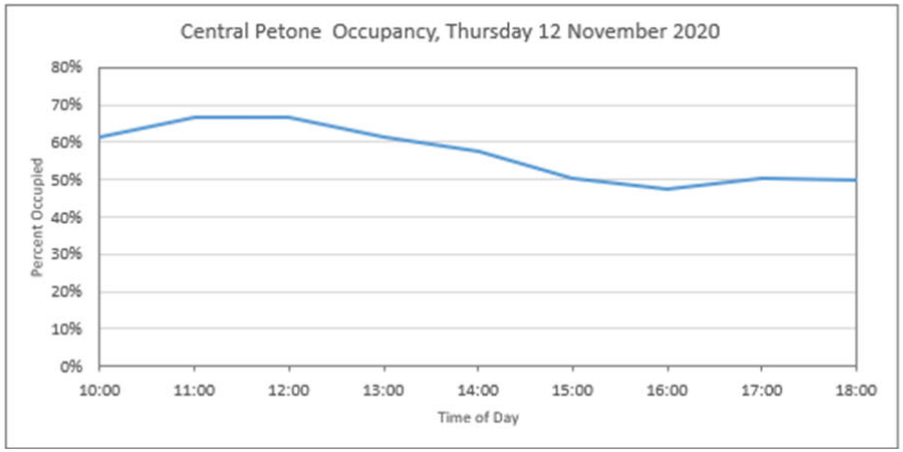

The Esplanade Occupancy, Saturday 7 November 2020
Number of Occupied Spaces
80
70
60
50
40
30
20
10
0
6:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

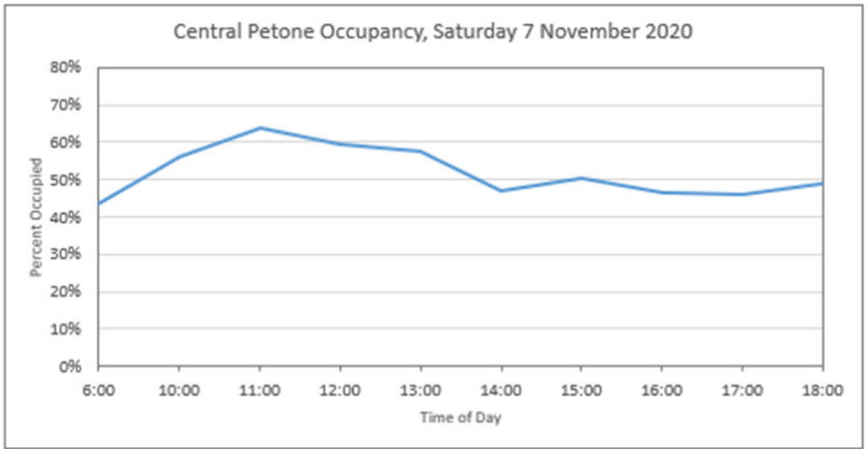

Western Petone Occupancy, Thursday 12 November 2020
Percent Occupied
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

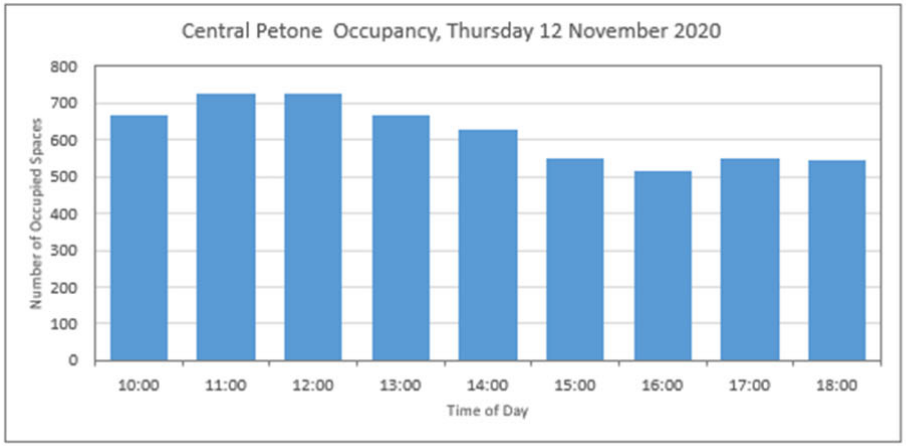

Western Petone Occupancy, Saturday 7 November 2020
Percent Occupied
80%
70%
60%
50%
40%
30%
20%
10%
0%
6:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

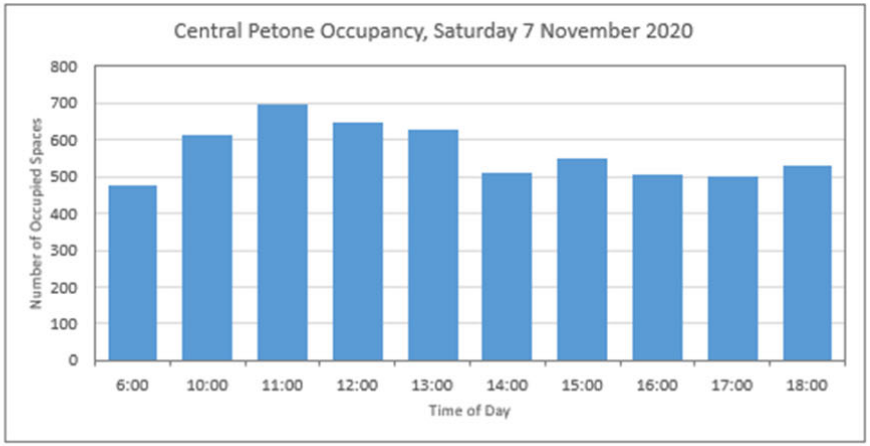

Western Petone Occupancy, Thursday 12 November 2020
Number of Occupied Spaces
450
400
350
300
250
200
150
100
50
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

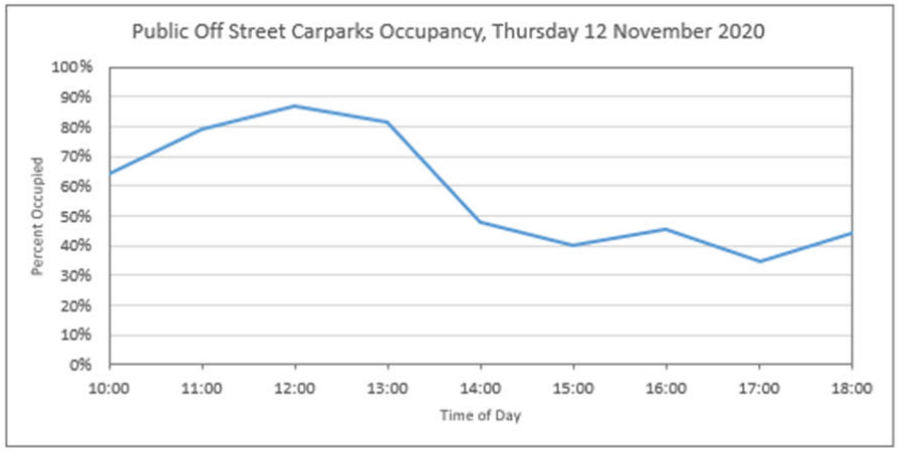

Western Petone Occupancy, Saturday 7 November 2020
Number of Occupied Spaces
450
400
350
300
250
200
150
100
50
0
6:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

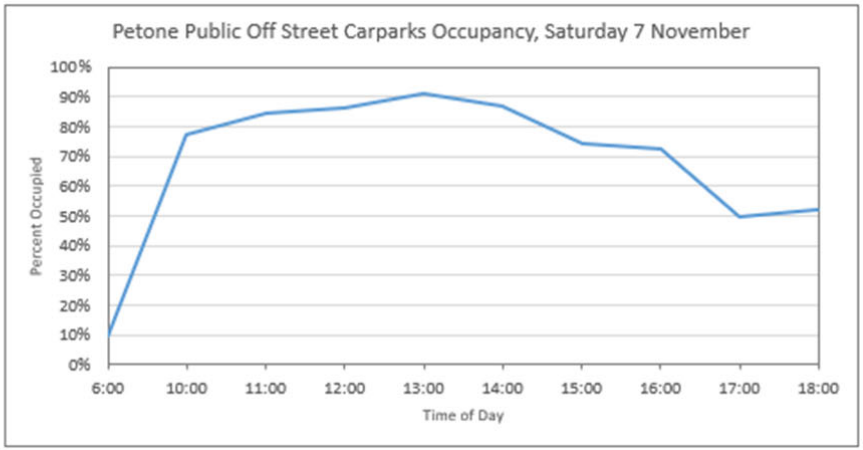

Central Petone Occupancy, Thursday 12 November 2020
Percent Occupied
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

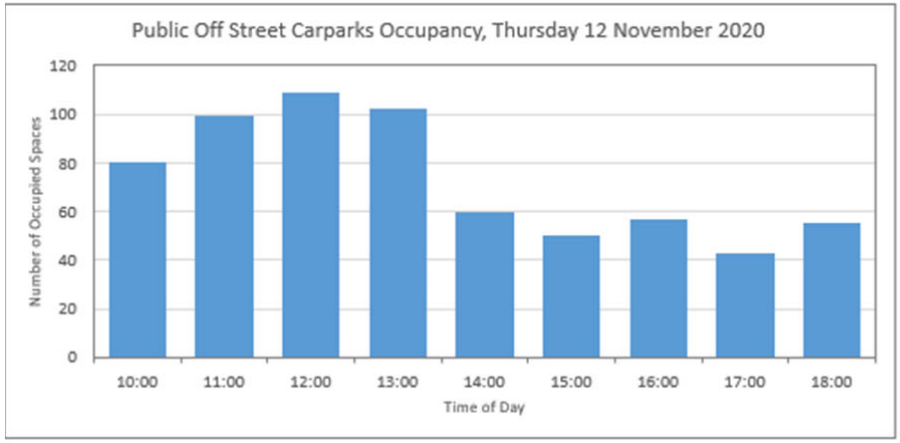

Central Petone Occupancy, Saturday 7 November 2020
Percent Occupied
80%
70%
60%
50%
40%
30%
20%
10%
0%
6:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

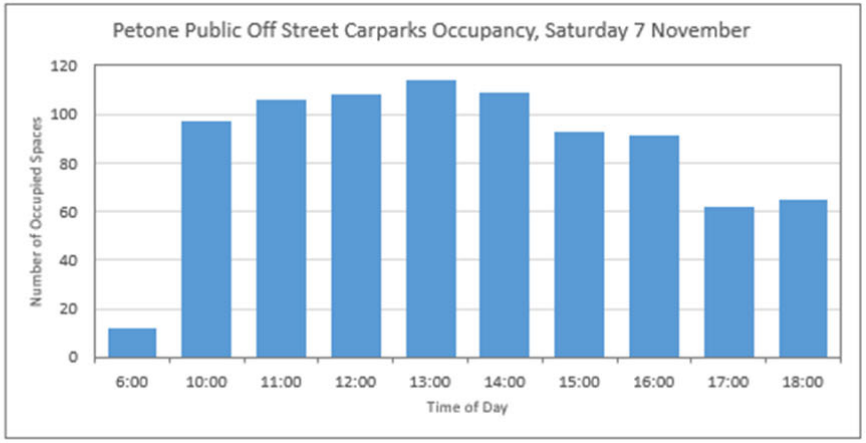

Central Petone Occupancy, Thursday 12 November 2020
Number of Occupied Spaces
800
700
600
500
400
300
200
100
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

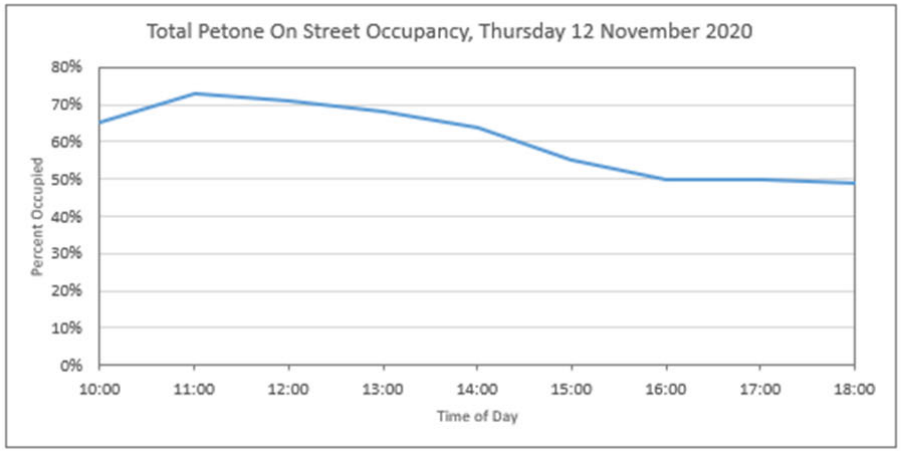

Central Petone Occupancy, Saturday 7 November 2020
Number of Occupied Spaces
800
700
600
500
400
300
200
100
0
6:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

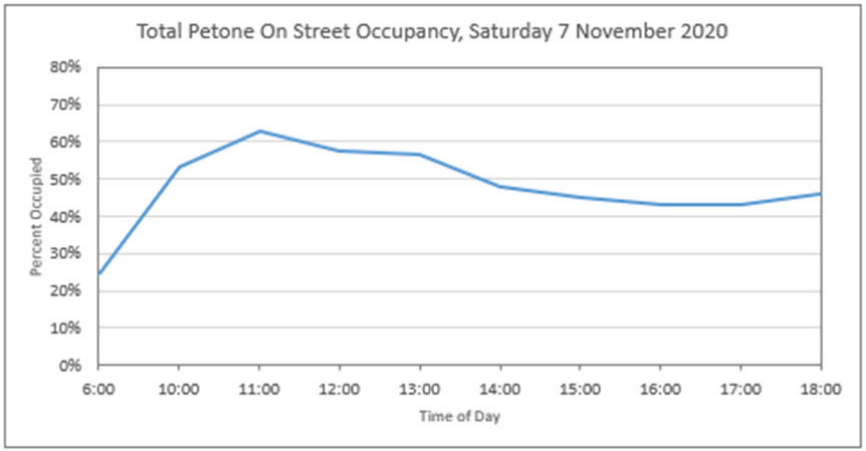

Public Off Street Carparks Occupancy, Thursday 12 November 2020
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

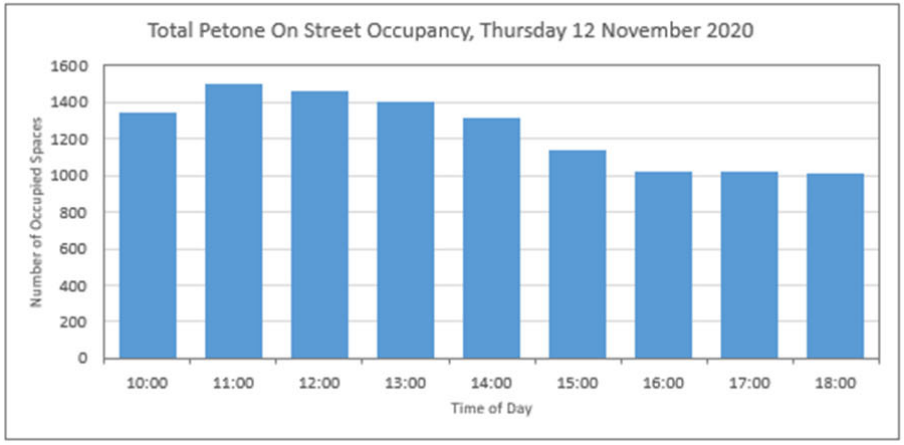

Petone Public Off Street Carparks Occupancy, Saturday 7 November
Percent Occupied
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
6:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

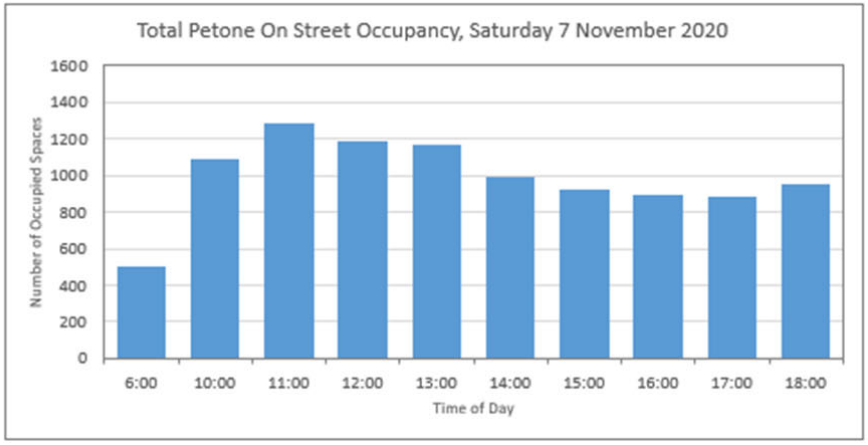

Public Off Street Carparks Occupancy, Thursday 12 November 2020
Number of Occupied Spaces
120
100
80
60
40
20
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day


Petone Public Off Street Carparks Occupancy, Saturday 7 November
Number of Occupied Spaces
120
100
80
60
40
20
0
6:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day


Total Petone On Street Occupancy, Thursday 12 November 2020
Percent Occupied
80%
70%
60%
50%
40%
30%
20%
10%
0%
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day


Total Petone On Street Occupancy, Saturday 7 November 2020
Percent Occupied
80%
70%
60%
50%
40%
30%
20%
10%
0%
6:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day


Total Petone On Street Occupancy, Thursday 12 November 2020
Number of Occupied Spaces
1600
1400
1200
1000
800
600
400
200
0
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day


Total Petone On Street Occupancy, Saturday 7 November 2020
Number of Occupied Spaces
1600
1400
1200
1000
800
600
400
200
0
6:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Time of Day

Appendix F – Petone Duration of Stay – Data

Location			Number of Hourly Observation Thursday 12 November								
Street	From	To	1	2	3	4	5	6	7	8	9
Hutt Road	Esplanade	Jackson	113	20	13	4	16	15	32	28	6
Hutt Road	Jackson	Petone	38	4	4	4	6	7	6	0	0
Hutt Road	Petone	Udy	64	11	4	4	3	5	15	0	0
Nevis Street	Esplanade	Hutt	192	24	3	2	0	1	2	0	0
Armidale Street	Esplanade	Lochy	0	0	0	0	0	0	0	0	0
Lochy Street	Armidale	Te Puni	40	11	4	2	4	0	0	0	0
Te Puni Street	Esplanade	Lochy	16	1	2	1	0	0	0	0	0
Te Puni Street	Lochy	Jackson	34	7	5	2	2	5	0	0	0
Annie Huggan	Te Puni	End	44	8	3	10	4	5	8	0	0
Gear Street	Jackson	Petone	47	15	4	2	1	4	8	0	0
Petone Ave	Hutt	Jackson	43	10	5	1	1	1	3	0	0
Union Street	Victoria	Sydney	7	5	1	6	5	0	1	1	0
Victoria Street	Esplanade	Jackson	20	3	5	1	1	1	0	0	2
Victoria Street	Jackson	Regent	46	17	10	13	4	4	1	1	10
Fitzherbert Street	Esplanade	Jackson	3	0	0	1	0	1	3	0	0
Fitzherbert Street	Jackson	Regent	24	4	7	1	0	1	3	2	2
Sydney Street	Esplanade	Jackson	14	2	1	1	1	0	0	0	2
Sydney Street	Jackson	Regent	28	6	6	0	0	4	0	1	6
Nelson Street	Esplanade	Jackson	56	18	5	11	6	7	1	8	22
Nelson Street	Jackson	Regent	38	16	4	11	1	5	7	5	8
Scholls Lane	Jackson	Campbell	14	1	0	3	3	1	2	1	10
Richmond Street	Esplanade	Jackson	77	26	10	6	5	5	8	2	8
Richmond Street	Jackson	Campbell	33	6	2	5	2	7	0	0	2
Bay Street	Esplanade	Jackson	60	13	9	14	11	5	2	5	14
Brittania Street	Jackson	Kirk	103	24	3	3	5	3	10	0	0
Brittania Street	Kirk	Udy	60	50	12	12	2	2	5	3	2
Beach Street	King	Jackson	24	5	7	5	3	4	1	3	4
King Street	Esplanade	Beach	17	7	2	8	3	1	0	1	2
Queen Street	Esplanade	Jackson	50	16	13	5	9	7	4	0	20
Elizabeth Street	Jackson	Kensington	96	12	16	1	7	4	14	0	8
Buick Stret West	Esplanade	Jackson	105	27	20	12	7	0	1	5	6
Buick Stret West	Jackson	Reserve	60	19	15	13	8	2	1	2	4
Buick Stret East	Esplanade	Jackson	145	19	13	6	3	3	4	0	2
Buick Stret East	Jackson	Reserve	58	12	8	3	4	4	7	0	2
Bolton Street	Esplanade	Jackson	64	8	10	4	0	2	6	0	2
Kensington Street	Jackson	Huia	91	48	20	3	18	0	7	0	0
Kensington Street	Huia	Udy	147	26	19	8	40	0	0	0	0
Tory Street	Esplanade	Jackson	161	12	7	3	2	1	12	0	0
Adelaide Street	Bolton	Cuba	69	13	8	3	1	4	0	1	0
Cuba Street	Esplanade	Jackson	91	16	15	12	3	0	14	2	0
The Esplanade	Hutt	Te Puni	54	12	11	9	0	1	4	6	0
The Esplanade	Te Puni	Richmond	54	5	4	1	7	7	9	3	0
The Esplanade	Victoria	Richmond	105	26	6	5	3	5	11	6	0
The Esplanade	Richmond	Brittania	22	10	6	1	1	0	1	0	0
The Esplanade	Brittania	Buick	10	1	1	0	0	0	0	2	0
The Esplanade	Buick	Cuba	17	1	0	0	0	0	2	0	0
Jackson Street	Hutt	Gear	127	24	8	7	11	3	7	0	0
Jackson Street	Gear	Victoria	24	4	1	0	0	0	8	0	0
Jackson Street	Victoria	Fiztherbert	116	15	0	1	0	0	0	0	0
Jackson Street	Fiztherbert	Sydney	98	17	4	1	1	0	0	0	0
Jackson Street	Sydney	Nelson	126	10	2	2	2	0	0	0	0
Jackson Street	Nelson	Richmond	137	20	1	0	0	0	0	0	0
Jackson Street	Richmond	Britannia	146	23	2	1	1	0	0	0	0
Jackson Street	Britannia	Elizabeth	117	20	1	0	0	0	1	0	0
Jackson Street	Elizabeth	Buick	111	8	0	0	0	0	0	0	0
Jackson Street	Buick	Kensington	112	2	1	0	0	0	0	0	0
Jackson Street	Kensington	Tory	127	23	2	0	1	0	0	0	0
Jackson Street	Tory	Cuba	85	7	1	2	0	0	0	0	0
Peel Place Carpark			20	45	27	11	8	7	0	2	0
Council / Library Carpark			15	25	0	1	0	0	0	0	0
Silbery Place Carpark			29	31	17	17	12	2	1	0	0
Beach Street Carpark			6	12	7	16	2	1	6	4	0
Bay Street Carpark			4	12	4	4	1	5	0	1	0

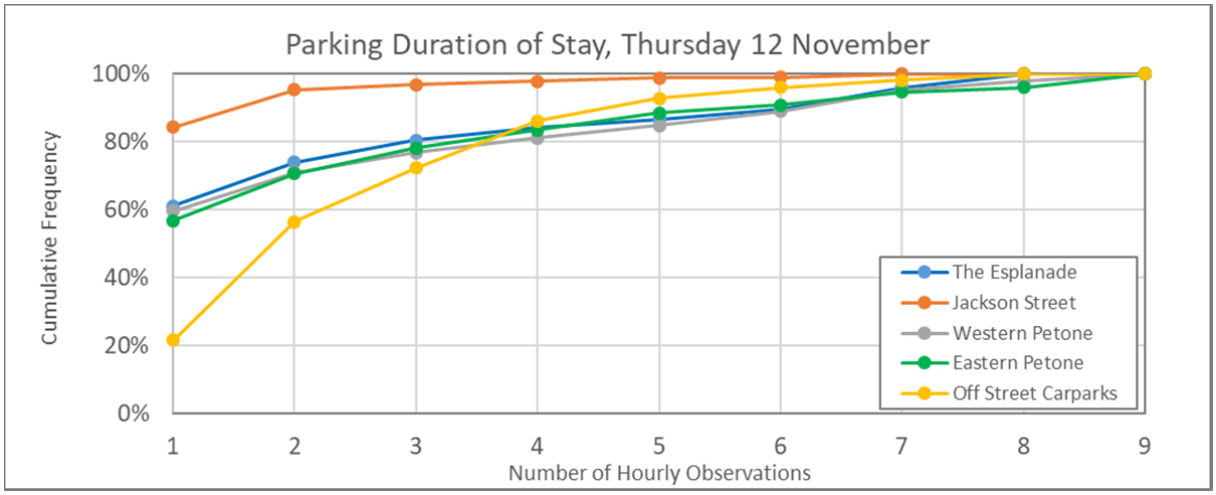
Number of Hourly Observation Saturday 7 November								
1	2	3	4	5	6	7	8	9
96	20	3	6	9	0	4	6	8
21	3	2	2	1	0	0	0	0
32	7	3	8	2	1	1	1	4
159	26	5	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
51	5	0	1	0	0	0	0	0
15	1	0	0	0	0	0	0	0
61	3	0	0	1	0	1	0	0
82	3	0	0	0	1	0	0	0
63	14	1	1	4	0	0	0	0
25	12	4	4	1	0	0	0	0
22	1	7	2	1	2	0	0	0
9	4	4	1	0	0	2	0	2
56	28	10	6	3	2	0	0	14
9	4	1	1	1	0	0	0	0
48	16	4	3	0	0	0	1	2
14	1	0	0	0	0	0	0	4
38	4	3	6	1	1	0	0	10
138	34	15	9	8	3	3	2	22
86	30	7	24	2	0	0	0	0
12	6	2	2	0	1	3	1	12
54	26	17	3	4	0	4	2	24
40	15	1	3	3	2	1	0	0
57	20	8	16	5	7	1	2	14
90	17	3	6	3	0	4	4	8
41	14	1	1	0	1	1	1	4
43	24	21	7	3	1	2	1	4
38	25	13	8	0	2	0	2	6
101	28	14	22	5	5	1	0	10
72	20	11	16	4	5	4	1	16
155	40	13	9	0	1	8	0	0
139	9	2	5	0	2	8	0	0
166	44	12	11	5	0	1	2	8
47	8	2	2	0	2	2	0	4
40	15	12	4	3	4	2	0	6
67	13	8	10	5	1	1	5	13
47	27	3	12	9	1	3	0	10
47	12	13	7	1	4	1	0	6
51	18	14	4	2	2	4	2	2
49	38	8	19	3	0	1	4	6
38	4	1	1	0	3	0	0	0
3	0	0	0	1	0	0	0	0
97	26	16	0	10	1	0	1	0
29	10	2	0	0	0	0	0	0
3	4	2	1	0	0	0	0	0
11	0	0	3	4	2	0	0	0
63	10	3	2	7	0	8	0	0
14	12	0	1	1	0	0	0	6
83	29	3	4	0	0	0	0	0
89	23	3	2	0	0	0	0	0
79	34	4	1	1	0	0	0	0
107	34	10	6	0	0	0	0	0
121	27	12	3	1	0	0	0	0
79	29	1	4	0	0	0	0	0
86	14	7	2	0	0	0	0	0
84	17	4	6	1	0	0	0	0
87	28	6	5	3	1	1	0	0
63	8	3	0	2	1	0	0	0
32	81	35	20	5	0	0	0	0
23	4	0	0	0	0	0	0	0
9	40	25	12	0	0	0	0	0
6	31	12	18	1	0	0	0	0
2	13	2	4	3	0	0	0	0

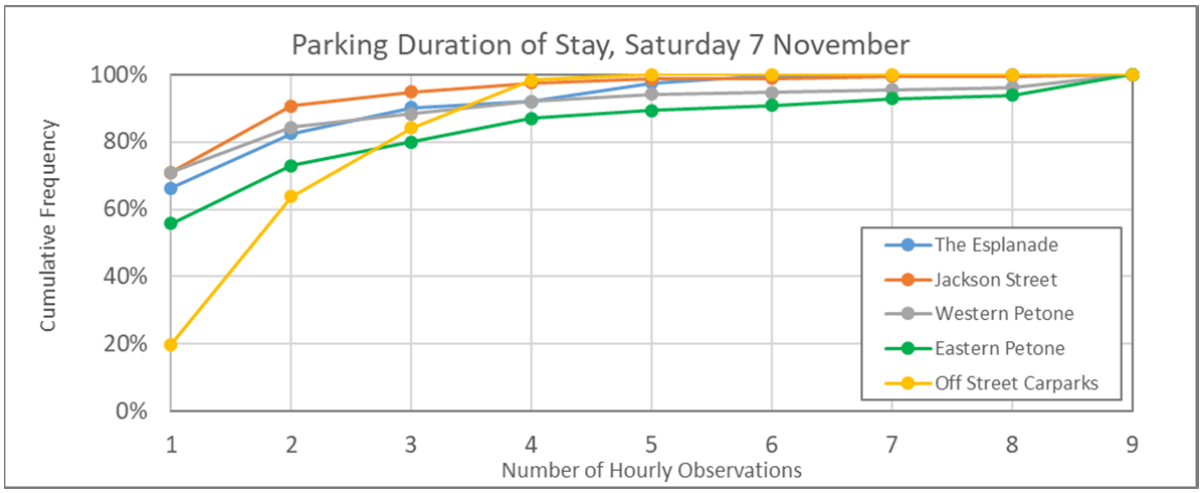
Jackson Street	1326	173	23	14	16	3	16	0	0
The Esplanade	262	55	28	16	11	13	27	17	0
Western Petone (commercial streets)	773	148	77	55	48	54	82	33	28
Central Petone (residential streets)	1619	394	218	151	143	67	106	38	116
Off Street Carparks	70	113	51	45	22	10	7	6	0
Total	4050	883	397	281	240	147	238	94	144

955	265	56	36	16	2	9	0	6
181	44	21	5	15	6	0	1	0
805	152	47	41	24	7	8	8	44
1580	483	200	200	65	44	55	29	175
70	156	72	50	6	0	0	0	0
3591	1100	396	332	126	59	72	38	225

Appendix G – Petone Duration of Stay - Graphs

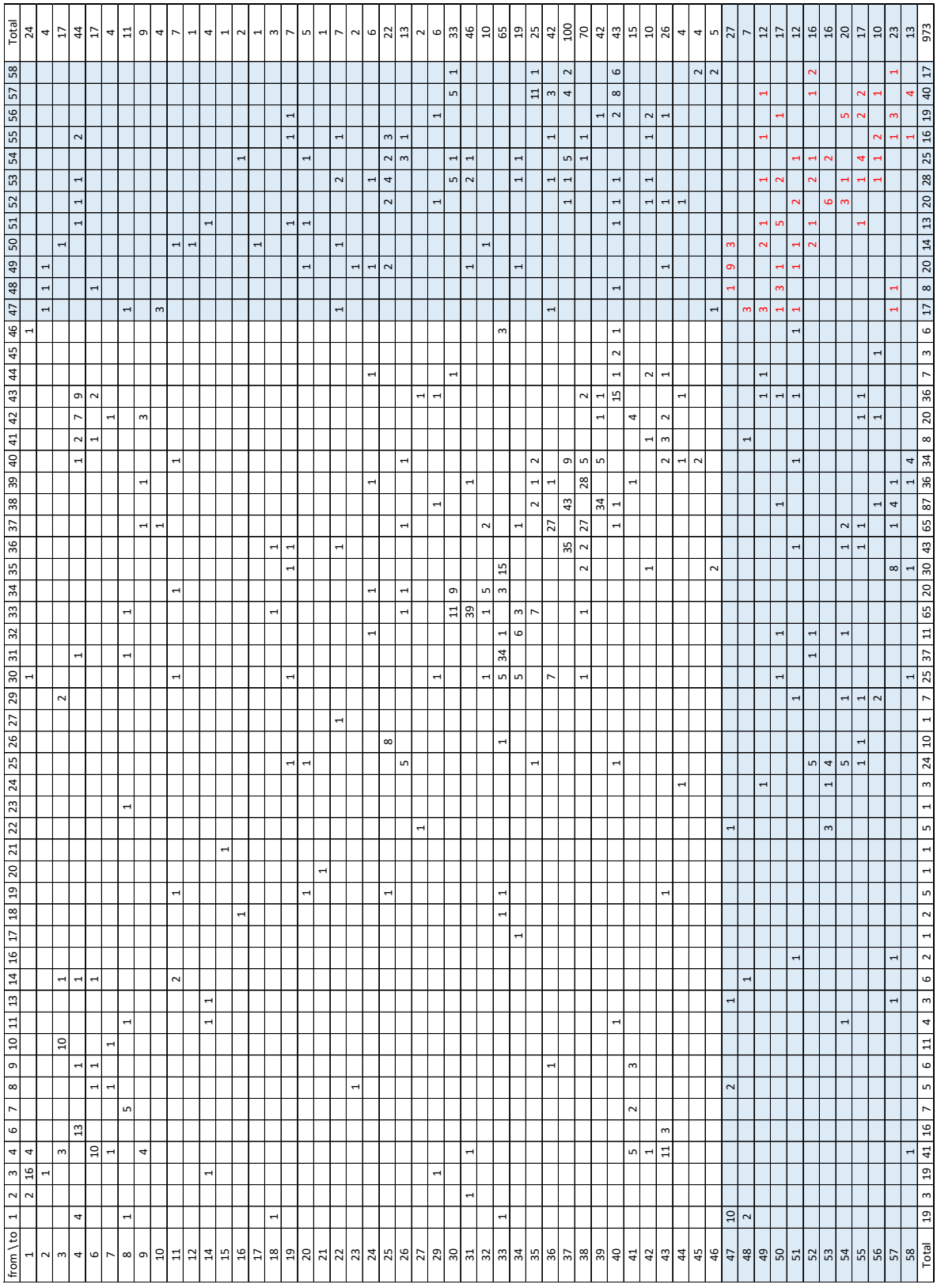
The x axis shows the number of observations while the y axis shows the cumulative proportion of vehicles that were observed or less. For example, 90 percent of vehicles in the off street carparks were observed five times or less on a weekday, while 56 percent of vehicles in the off street carparks were observed two times or less.



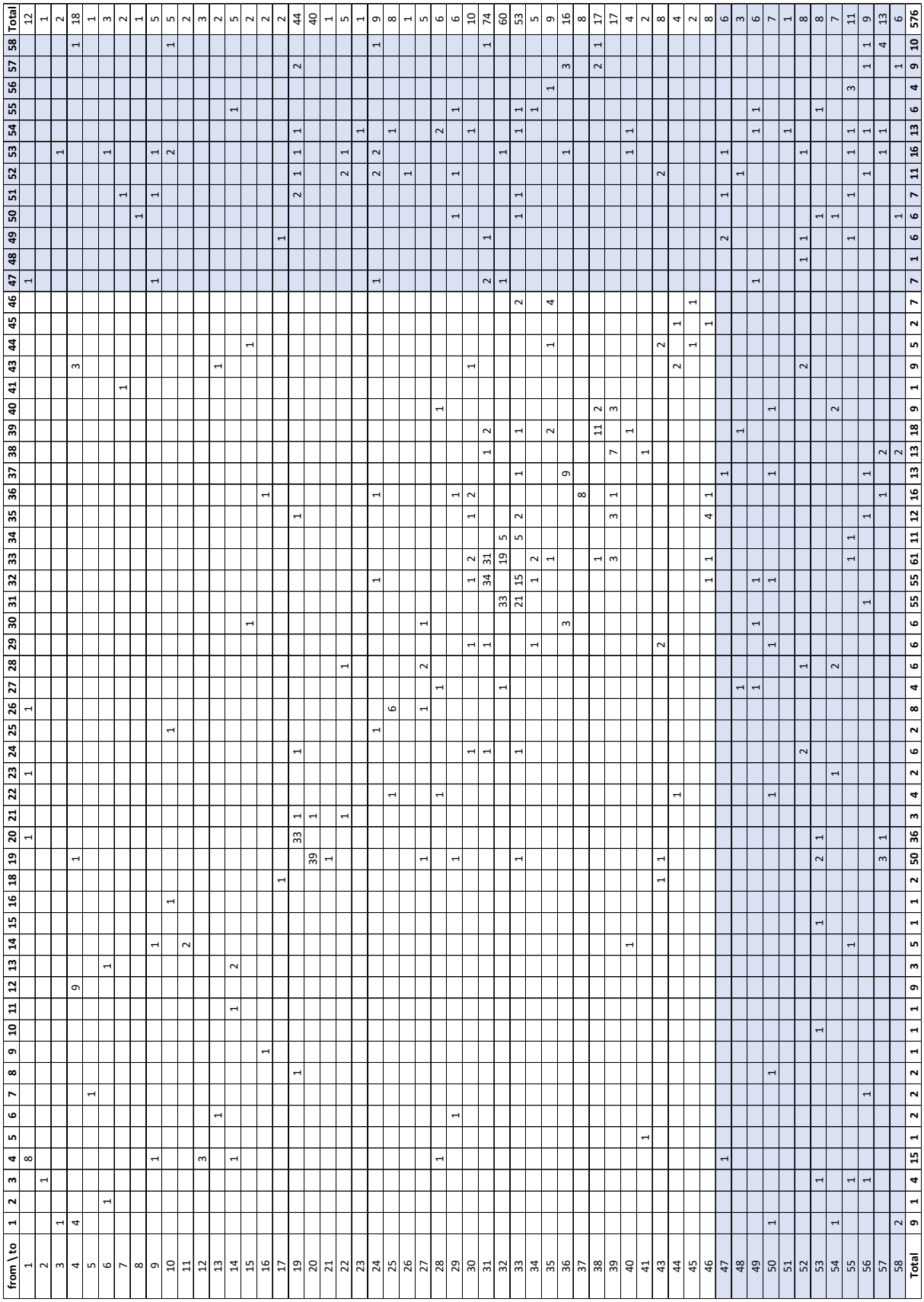


Appendix H – Vehicle Displacement, Petone

Vehicles moved Weekday



Vehicles Moved Saturday

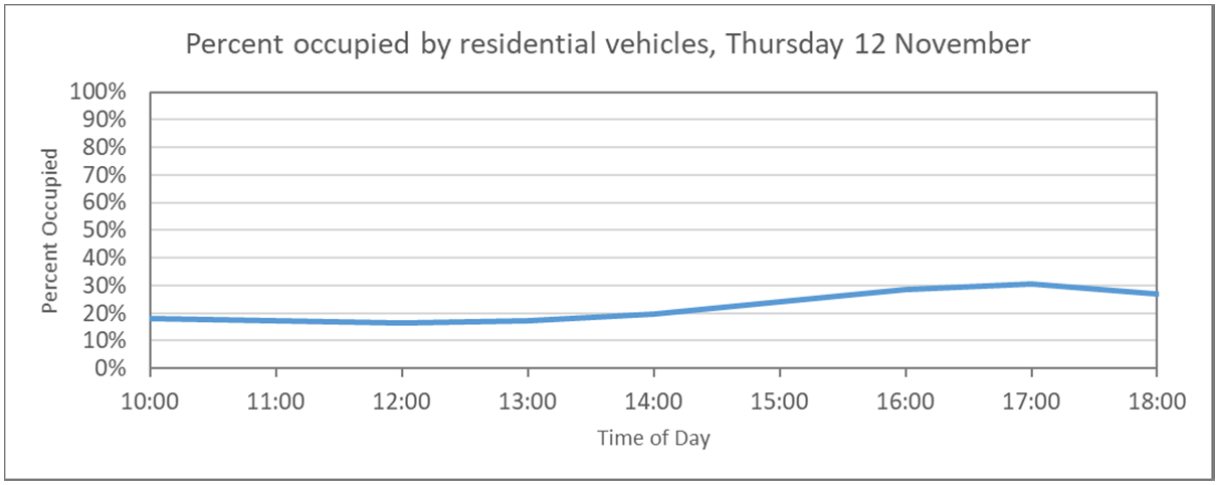


from \ to	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	Total
1				8																1		1					1																																12
2		1																																																										1
3	1																																																									2
4	4											9							1																																							18
5							1																																																			1
6		1											1																																												3
7																																																									2
8																																																									1
9				1									1																																												5
10																										1																																5
11													2																																												2
12				3																																																					3
13						1																																																			2
14				1								1		2																																										5
15															1																																									2
16										1																																														2
17																			1																																						2
19								1												33	1			1											1																				44
20																					1																																				40
21																				1																																				1
22																						1																																		5
23																																																										1
24																				1				1											1																				9
25																									1																														8
26																										6																												1
27																											1																												5
28					1																							1																										6
29						1																							1																										6
30																														1																										10
31																															1																										74
32																																33																										60
33																				1				1								21	15		5	2		1		1																53
34																																1	2																								5
35																																	1						2																		9
36																																3				9																				16
37																																				8																				8
38																																					11	2																		17
39																																	3				3		7		1														17
40																																								1																4
41																																									1															2
43																																										2															8
44																								1																																4
45																																											2		1		1												2
46																																											1														8
47				1																												1	1		4	1		1																		6
48																											1																												3
49																																											1														6
50	1							1																																															7
51																																																								1
52																																																									8
53			1								1									2	1																																		8
54	1														1							1																																	7
55			1					1																																															11
56			1				1																																															9
57																																																									13
58	2																																																								6
Total	9	1	4	15	1	2	2	2	1	1	1	9	3	5	1	1	2	1	50	36	3	4	2	6	2	8	6	27	6	6	55	61	11	12	16	13	18	9	1	5	2	7	6	1	7	1	6	7	11	16	13	6	4	9	10	576

Appendix I – Proportion Residents on Residential Streets

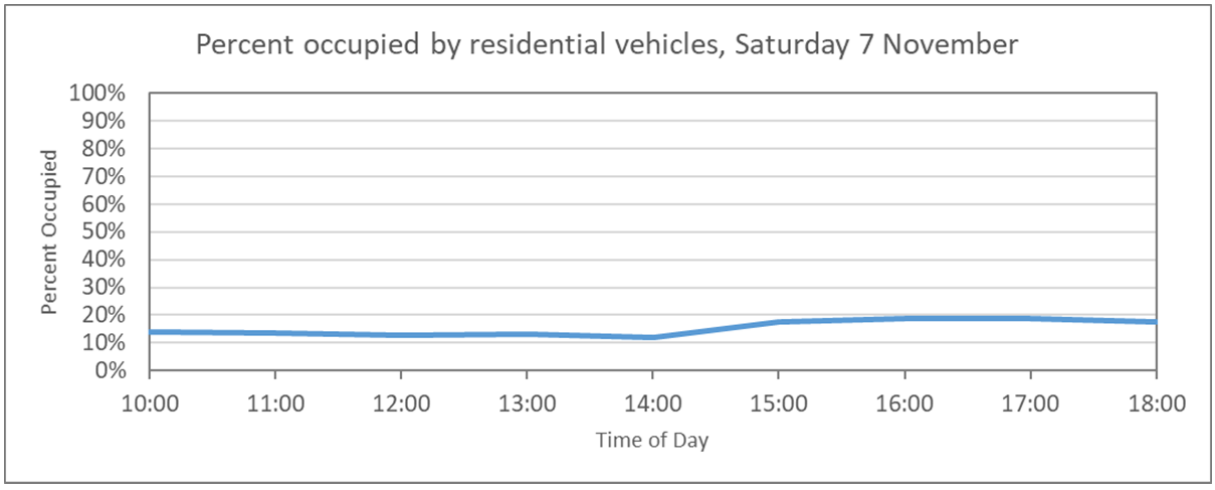
Location			Spaces				Total Spaces Occupied by Residents						Thursday 12 November 2020			
Street	From	To	<P120	P120-240	All Day	Total	6:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Nelson Street	Esplanade	Jackson	0	0	50	50	22	18	13	14	14	13	13	11	13	9
Nelson Street	Jackson	Campbell	0	0	40	40	11	6	7	7	6	4	7	6	6	5
Scholls Lane	Jackson	Campbell	0	0	14	14	2	1	1	1	1	1	1	1	1	2
Richmond Street	Esplanade	Jackson	4	0	53	57	22	8	7	8	8	9	7	7	8	12
Richmond Street	Jackson	Campbell	5	0	10	15	5	4	5	5	4	4	4	2	2	5
Bay Street	Esplanade	Jackson	6	0	68	74	24	11	12	11	12	11	11	12	13	13
Beach Street	King	Jackson	3	0	28	31	6	2	3	2	4	4	6	7	6	5
King Street	Esplanade	Beach	0	0	39	39	6	4	4	4	5	3	5	5	6	3
Queen Street	Esplanade	Jackson	7	0	77	84	26	13	13	15	15	16	18	22	26	22
Elizabeth Street	Jackson	Kensington	4	0	50	54	19	6	6	6	5	10	7	11	6	10
Buick Stret West	Esplanade	Jackson	2	0	64	66	21	14	15	12	11	14	16	17	21	14
Buick Stret West	Jackson	Reserve	5	8	25	38	5	3	4	5	4	5	4	5	4	5
Buick Stret East	Esplanade	Jackson	2	0	63	65	19	10	9	6	9	7	7	8	11	7
Buick Stret East	Jackson	Reserve	0	0	24	24	3	2	2	2	3	3	4	2	5	3
Bolton Street	Esplanade	Jackson	3	0	70	73	13	6	6	6	4	6	7	9	18	13
Tory Street	Esplanade	Jackson	7	0	41	48	22	8	13	11	6	10	11	13	15	15
Adelaide Street	Buick	Cuba	0	0	47	47	15	4	4	6	5	4	5	10	6	3
Central Petone (residential streets)			48	8	763	819	241	120	124	121	116	124	133	148	167	146

Location			Percent Occupied by Residents						Thursday 12 November 2020				Percent Occupied		
Street	From	To	6:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	MAX	Average	Ave 12-16
Nelson Street	Esplanade	Jackson	100%	35%	27%	27%	26%	30%	31%	35%	39%	32%	39%	31%	29%
Nelson Street	Jackson	Campbell	100%	21%	20%	20%	17%	13%	21%	21%	26%	21%	26%	20%	18%
Scholls Lane	Jackson	Campbell	100%	8%	8%	8%	8%	8%	11%	9%	10%	20%	20%	10%	9%
Richmond Street	Esplanade	Jackson	100%	25%	18%	20%	19%	28%	22%	21%	31%	43%	43%	25%	22%
Richmond Street	Jackson	Campbell	100%	40%	50%	38%	33%	36%	31%	18%	20%	42%	50%	34%	35%
Bay Street	Esplanade	Jackson	100%	30%	27%	22%	24%	26%	31%	36%	46%	46%	46%	32%	26%
Beach Street	King	Jackson	100%	10%	13%	10%	16%	21%	38%	50%	50%	45%	50%	28%	21%
King Street	Esplanade	Beach	100%	36%	27%	33%	33%	43%	63%	63%	86%	38%	86%	47%	43%
Queen Street	Esplanade	Jackson	100%	35%	36%	34%	35%	42%	60%	73%	93%	63%	93%	52%	43%
Elizabeth Street	Jackson	Kensington	100%	16%	17%	18%	15%	26%	24%	28%	19%	36%	36%	22%	21%
Buick Stret West	Esplanade	Jackson	100%	39%	34%	30%	31%	44%	55%	55%	58%	40%	58%	43%	40%
Buick Stret West	Jackson	Reserve	100%	13%	10%	13%	12%	16%	15%	22%	20%	23%	23%	16%	14%
Buick Stret East	Esplanade	Jackson	100%	27%	25%	13%	30%	26%	39%	38%	58%	32%	58%	32%	27%
Buick Stret East	Jackson	Reserve	100%	6%	6%	6%	13%	12%	22%	13%	50%	50%	50%	20%	13%
Bolton Street	Esplanade	Jackson	100%	35%	43%	46%	33%	46%	50%	64%	95%	76%	95%	54%	44%
Tory Street	Esplanade	Jackson	100%	40%	41%	50%	46%	63%	14%	65%	63%	63%	65%	49%	43%
Adelaide Street	Buick	Cuba	100%	22%	19%	26%	29%	24%	28%	56%	38%	38%	56%	31%	27%
Central Petone (residential streets)			100%	18%	17%	17%	17%	20%	24%	29%	30%	27%	30%	22%	19%



Location			Spaces				Total Spaces Occupied by Residents					Saturday 7 November 2020			
Street	From	To	<P120	P120-240	All Day	Total	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Nelson Street	Esplanade	Jackson	0	0	50	50	12	20	12	11	9	11	18	11	11
Nelson Street	Jackson	Campbell	0	0	40	40	8	1	7	6	7	7	1	7	7
Scholls Lane	Jackson	Campbell	0	0	14	14	3	3	3	3	4	4	3	4	3
Richmond Street	Esplanade	Jackson	4	0	53	57	11	9	6	5	5	6	8	10	9
Richmond Street	Jackson	Campbell	5	0	10	15	2		1	2	2	1		3	2
Bay Street	Esplanade	Jackson	6	0	68	74	6	7	6	5	4	3	4	5	5
Beach Street	King	Jackson	3	0	28	31	2	2	2	2	1	1	1	1	1
King Street	Esplanade	Beach	0	0	39	39	2	4	5	4	2	3	4	5	5
Queen Street	Esplanade	Jackson	7	0	77	84	10	11	9	8	5	13	10	10	10
Elizabeth Street	Jackson	Kensington	4	0	50	54	4	4	4	4	4	4	5	5	5
Buick Stret West	Esplanade	Jackson	2	0	64	66	7		8	7	4	7	7	5	4
Buick Stret West	Jackson	Reserve	5	8	25	38	3	8	4	4	3	4	4	4	3
Buick Stret East	Esplanade	Jackson	2	0	63	65	6	9	8	5	5	6	7	10	9
Buick Stret East	Jackson	Reserve	0	0	24	24	2	2	2	2	2	2	2	2	2
Bolton Street	Esplanade	Jackson	3	0	70	73	7	6	7	7	6	7	7	6	5
Tory Street	Esplanade	Jackson	7	0	41	48	4	4	5	6	6	7	5	5	4
Adelaide Street	Buick	Cuba	0	0	47	47	3	7	4	5	4	6	7	5	6
Cuba Street	Esplanade	Jackson	4	0	50	54	1	2	1	3	1	4	4	4	4
Central Petone (residential streets)			52	8	813	873	93	99	94	89	74	96	97	102	95

Location			Percent Occupied by Residents				Saturday 7 November 2020					Percent Occupied		
Street	From	To	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	MAX	Average	Ave 12-16
Nelson Street	Esplanade	Jackson	25%	23%	26%	23%	21%	25%	32%	31%	31%	32%	26%	24%
Nelson Street	Jackson	Campbell	23%	17%	21%	20%	21%	27%	33%	41%	27%	41%	26%	22%
Scholls Lane	Jackson	Campbell	25%	20%	23%	23%	27%	27%	23%	31%	27%	31%	25%	25%
Richmond Street	Esplanade	Jackson	28%	20%	16%	14%	16%	17%	28%	32%	28%	32%	22%	16%
Richmond Street	Jackson	Campbell	18%	0%	8%	15%	18%	10%	0%	33%	17%	33%	13%	13%
Bay Street	Esplanade	Jackson	16%	18%	15%	15%	11%	10%	12%	19%	19%	19%	15%	13%
Beach Street	King	Jackson	7%	7%	8%	9%	4%	4%	5%	5%	4%	9%	6%	6%
King Street	Esplanade	Beach	9%	16%	25%	24%	14%	13%	21%	25%	21%	25%	19%	19%
Queen Street	Esplanade	Jackson	29%	24%	20%	17%	19%	30%	32%	32%	26%	32%	26%	22%
Elizabeth Street	Jackson	Kensington	11%	11%	9%	11%	14%	11%	15%	17%	17%	17%	13%	11%
Buick Stret West	Esplanade	Jackson	15%		15%	14%	15%	20%	19%	15%	11%	20%	16%	16%
Buick Stret West	Jackson	Reserve	12%	16%	14%	17%	23%	25%	33%	29%	23%	33%	21%	20%
Buick Stret East	Esplanade	Jackson	15%	12%	17%	14%	23%	22%	23%	25%	20%	25%	19%	19%
Buick Stret East	Jackson	Reserve	13%	11%	15%	17%	20%	25%	18%	18%	15%	25%	17%	19%
Bolton Street	Esplanade	Jackson	44%	35%	30%	33%	33%	37%	35%	30%	26%	44%	34%	33%
Tory Street	Esplanade	Jackson	22%	22%	23%	30%	30%	32%	36%	20%	22%	36%	26%	29%
Adelaide Street	Buick	Cuba	14%	25%	14%	22%	24%	29%	35%	26%	35%	35%	25%	22%
Cuba Street	Esplanade	Jackson	4%	6%	6%	8%	6%	15%	15%	14%	13%	15%	10%	9%
Central Petone (residential streets)			14%	14%	13%	13%	12%	17%	19%	19%	17%	19%	15%	14%



Cardno (NZ) Limited
Level 5, IBM Building
25 Victoria Street
Petone 5012
New Zealand
Phone +64 4 478 0342
www.cardno.com

Document Status

Revision	Author	Reviewer		Approved by		Date
		Name	Signature	Name	Signature	
Draft	L Skilton					
Final						

Appendix J Construction Traffic Movements

Riverlink Construction Resource

Stage 1		Quantity	Unit	Off Road Plant: 12t - 20t Excavator	30t plus Excavator	D6 Dozer or equivalent	8m3 Truck / Off Road Truck	Off Road Dumper	Compactor	2m3+Loader	Grader	Paver	On Road: 8m3 Truck	Truck and Trailer	Light Vehicle/ Ute/ Crew Cab	Plant Maintenance	Duration: days	Critical Path	Road Trips/Day: 8m3 Truck	Truck and Trailer	Light Vehicle/ Ute/ Crew Cab	Plant Maintenance	0	Total Trips: 8m3 Truck	Truck and Trailer	Light Vehicle/ Ute/ Crew Cab	Plant Maintenance	0
1	**Preliminary and General**																											
1.1	Site Compound		1	ea																								
1.2	Plant establishment/Disestablishment		1	ea																								
2	Traffic Management																											
2.1	Traffic Management		1	day									2		2		272.9992		10		20			5459.983	0	10919.97	0	0
																								0	0	0	0	0
3	**Environmental Controls**																							0	0	0	0	0
3.1	Establish ESC measures		1		1								1		1		5	5	4		10	2		20	0	50	0	0
3.2	Maintain ESC meaures		1		1										1		100				6	2		0	0	600	0	0
																								0	0			
4	**Site Clearance**																							0	0			
4.1	Building Demolition		50		1								2		1	1	2	20	8		4	2		1600	0	400	200	0
4.2	Vegetation (Tree) removal		1		1			1							2	1	10				10	2		0	0	200	20	0
4.3	General Site Clearance		1		1		1	2							1	1	10	5			10	2		0	0	100	20	0
																								0	0			
5	**Services Protection and Diversion**																							0	0			
5.1	General		1		1			2							2	1	40				10	2		0	0	800	80	0
5.2	WWL WasterWater pipeline		1		2								2		2	1	40	20	4		10	4		320	0	800	160	0
																								0	0	0	0	0
6	**Earthworks**	**m3**																						0	0	0	0	0
	Right Bank Downstream of bridge																							0	0			
6.1	Topsoil strip		1		2			4							2	1	5	5			10	2		0	0	100	10	0
6.2	Construct temporary flood protection measures		1		1		1			2			4		2	1	20	10	10		10	4		800	0	400	80	0
6.3	Deconstruction existing stopbank to bulk fill in new	60000	0.8		2	1	1		3	2			1		4	1	24	12	10		10	4		192	0	768	76.8	0
6.4	Cut to fill to new stopbank	120000	0.8		2	2	1		4	2			2		5	1	24	12	10		10	4		384	0	960	76.8	0
6.5	Cut to stockpile for processing	10000	0.8		2				2				2		2	1	4		10		10	2		64	0	64	6.4	0
6.6	Import to stopbank processed material	10000	0.8		1		1		2	2	1		1		2	1	5.333333	5.333333	10		10	2		42.66667	0	85.33333	8.533333	0
6.7	Import material from off site (low permeability layer)	6750	0.8		1		1			2				6	2	1	12	6		10				0	576	0	0	0
6.8	Import material from off site (bulk fill)																							0	0	0	0	0
6.9	Import Topsoil	1500	0.8		1		1			2				4	2	1	4	4		10				0	128	0	0	0
6.10	Supply and Place Rip Rap	20000	0.8		1		1			2			8		2	1	50	5	10					3200	0	0	0	0
6.11																								0	0	0	0	0
	Left Bank upstream of bridge																							0	0			
6.1	Topsoil strip		1		2			4							2	1	5	5			10	2		0	0	100	10	0
6.2	Construct temporary flood protection measures		1		1		1			2			4		2	1	15	7.5	10		10	4		600	0	300	60	0
6.3	Deconstruction existing stopbank to bulk fill in new	45000	1		2	1	1		3	2			1		4	1	18	9	10		10	4		144	0	576	57.6	0
6.4	Cut to fill to new stopbank	75000	1		2	2	1		4	2			2		5	1	18.75	9.375	10		10	4		375	0	937.5	75	0
6.5	Cut to stockpile for processing	7500	1		2				2				2		2	1	3.75		10		10	2		75	0	75	7.5	0
6.6	Import to stopbank processed material	7500	1		1		1		2	2	1		1		2	1	5	5	10		10	2		50	0	100	10	0
6.7	Import material from off site (low permeability layer)	4968	1		1		1			2				6	2	1	11.04	5.52		10	10	2		0	662.4	220.8	22.08	0
6.8	Import material from off site (bulk fill)																							0	0	0	0	0
6.9	Import Topsoil	1000	1		1		1			2				4	2	1	3.333333	3.333333		10	10	2		0	133.3333	66.66667	6.666667	0
6.10	Supply and Place Rip Rap	15000	1		1		1			2			8		2	1	46.875	23.4375	10		10	2		3750	0	937.5	93.75	0
6.11	Export Surplus to Pharazyn Street	45000	1		2	2	1	5	2	1			1	1	5	1	11.25	11.25	10	10	10	2		112.5	112.5	562.5	22.5	0
6.12	Export Surplus to Trainstation Carpark	55000	1		2	2	1	5	2	1			1	1	5	1	13.75	13.75	10	10	10	2		137.5	137.5	687.5	27.5	0
																								0	0	0	0	0
7	**Stormwater**																							0	0	0	0	0
7.1	Pump Station		1		1								2		2	1	30		2		10	2		120	0	600	60	0
7.2	General		1		2	1							3		3	1	40	10	6		10	2		720	0	1200	80	0
																								0	0	0	0	0
8	**Misc Water and Waster protection/diversiosn**																							0	0	0	0	0
8.1	General		1		2								2		2	1	40	10	6		10	2		480	0	800	80	0
																								0	0	0	0	0
9	**Roads**																							0	0	0	0	0
9.1	Kerbing		1		2				1	1	1		3		2	1	10	5	6		10	2		180	0	200	20	0
9.2	Paths		1		2				1	1	1		3		2	1	20	10	6		10	2		360	0	400	40	0
9.3	Aggregate	6300	1						3	1	1		1	4	2		28	14	4	8	10	2		224	896	560	0	0
9.4	Surfacing		1						2			1	5		2		3	1.5	8		8	2		120	0	48	0	0
																								0	0	0	0	0
10	**Traffic Services/furniture**																							0	0	0	0	0
10.1	General		1		1				1	1	1		1		1	1	10	5	6		10	2		60	0	100	20	0
																								0	0	0	0	0
11	**Retaining Walls**																							0	0	0	0	0
11.1	Pharazyn/Marsden		1		2				2	1			2		1		10	5	4		8	2		80	0	80	0	0
11.2																								0	0	0	0	0
																								0	0	0	0	0
12	**Structures**																							0	0	0	0	0
12.1	Pedestrian Bridge	see separate																						0	0	0	0	0
12.2	Melling River Bridge	see separate																						0	0	0	0	0
12.3	Interchange Bridge	see separate																						0	0	0	0	0
12.4	Station and Platform	see separate																						0	0	0	0	0
																								0	0	0	0	0
13	**Landscaping**																							0	0	0	0	0
13.1	Landscaping		1		2				1	1			1		4	1	40	10	2		10	2		80	0	1600	80	0
																	272.9992							19750.65	2645.733	26398.77	1511.13	0
																	Average per day							72.34692	9.69136	96.69907	5.535292	0
																	382.1988											

Riverlink Construction Resource

		Quantity	Unit	Off Road Plant										On Road				Duration		Road Trips/Day				Total Trips				
				12t - 20t Excavator	30t plus Excavator	D6 Dozer or equivalent	8m3 Truck / Off Road Truck	Off Road Dumper	Compactor	2m3+ Loader	Grader	Paver		8m3 Truck	Truck and Trailer	Light Vehicle/ Ute/ Crew Cab	Plant Maintenance	days	Critical Path	8m3 Truck	Truck and Trailer	Light Vehicle/ Ute/ Crew Cab	Plant Maintenance	8m3 Truck	Truck and Trailer	Light Vehicle/ Ute/ Crew Cab	Plant Maintenance	0
Stage 2													0															
1	**Preliminary and General**																											
1.1	Site Compound		1 ea																									
1.2	Plant establishment/Disestablishment		1 ea																									
2	Traffic Management																											
2.1	Traffic Management		1 day											2		2		178.75		10		20		3575	0	7150	0	0
																								0	0	0	0	0
3	**Environmental Controls**																							0	0	0	0	0
3.1	Establish ESC measures		1	1										1		1		5	5	4		10	2	20	0	50	0	0
3.2	Maintain ESC meaures		1	1												1		100				6	2	0	0	600	0	0
																								0	0			
4	**Site Clearance**																							0	0			
4.1	Building Demolition		0	1										2		1	1	2	10	8		4	2	0	0	0	0	0
4.2	Vegetation (Tree) removal		1	1			1									2	1	10				10	2	0	0	200	20	0
4.3	General Site Clearance		1	1		1	2									1	1	10	5			10	2	0	0	100	20	0
																								0	0			
5	**Services Protection and Diversion**																							0	0			
5.1	General		1	1			2									2	1	40				10	2	0	0	800	80	0
5.2	WWL WasterWater pipeline																							0	0	0	0	0
																								0	0	0	0	0
6	**Earthworks**	**m3**																						0	0	0	0	0
	Right Bank Downstream of bridge																							0	0			
6.1	Topsoil strip		1	2			4									2	1	5				10	2	0	0	100	10	0
6.2	Construct temporary flood protection measures		1	1		1			2					4		2	1	20		10		10	4	800	0	400	80	0
6.3	Deconstruction existing stopbank to bulk fill in new	60000	0.1	2	1	1		3	2					1		4	1	3		10		10	4	3	0	12	1.2	0
6.4	Cut to fill to new stopbank	120000	0.1	2	2	1		4	2					2		5	1	3		10		10	4	6	0	15	1.2	0
6.5	Cut to stockpile for processing	10000	0.1	2				2						2		2	1	0.5		10		10	2	1	0	1	0.1	0
6.6	Import to stopbank processed material	10000	0.1	1		1		2	2	1				1		2	1	0.666667		10		10	2	0.666667	0	1.333333	0.133333	0
6.7	Import material from off site (low permeability layer)	6750	0.1	1		1			2						6	2	1	1.5			10			0	9	0	0	0
6.8	Import material from off site (bulk fill)																							0	0	0	0	0
6.9	Import Topsoil	1500	0.1	1		1			2						4	2	1	0.5			10			0	2	0	0	0
6.10	Supply and Place Rip Rap	20000	0.1	1		1			2					8		2	1	6.25		10				50	0	0	0	0
6.11																								0	0	0	0	0
	Left Bank Downstream of bridge																							0	0			
6.1	Topsoil strip		0.6	2			4									2	1	5	5			10	2	0	0	60	6	0
6.2	Construct temporary flood protection measures		0.6	1		1			2					4		2	1	15	7.5	10		10	4	360	0	180	36	0
6.3	Deconstruction existing stopbank to bulk fill in new	45000	0.6	2	1	1		3	2					1		4	1	13.5	6.75	10		10	4	81	0	324	32.4	0
6.4	Cut to fill to new stopbank	20000	0.6	2	2	1		4	2					2		5	1	3	1.5	10		10	4	36	0	90	7.2	0
6.5	Cut to stockpile for processing	5000	0.6	2				2						2		2	1	1.5		10		10	2	18	0	18	1.8	0
6.6	Import to stopbank processed material	5000	0.6	1		1		2	2	1				1		2	1	2	2	10		10	2	12	0	24	2.4	0
6.7	Import material from off site (low permeability layer)	6750	0.6	1		1			2						6	2	1	9	4.5		10	10	2	0	324	108	10.8	0
6.8	Import material from off site (bulk fill)	135000	0.6	1		1			2						12	2	1	90	86		10	10		0	6480	1080	0	0
6.9	Import Topsoil	1000	0.6	1		1			2						4	2	1	2	2		10	10	2	0	48	24	2.4	0
6.10	Supply and Place Rip Rap	15000	0.6	1		1			2					8		2	1	28.125		10		10	2	1350	0	337.5	33.75	0
6.11	Export Surplus to Rutherford Street/Queens Drive		0.6	2	2	1		5	2	1				1	1	5	1	0	0	10	10	10	2	0	0	0	0	0
6.12																		0	0					0	0	0	0	0
																								0	0	0	0	0
7	**Stormwater**																							0	0	0	0	0
7.1	Pump Station		1	1										2		2	1	30		2		10	2	120	0	600	60	0
7.2	General		1	2	1									3		3	1	20	5	6		10	2	360	0	600	40	0
																								0	0	0	0	0
8	**Misc Water and Waster protection/diversiosn**																							0	0	0	0	0
8.1	General		1	2										2		2	1	20	5	6		10	2	240	0	400	40	0
																								0	0	0	0	0
9	**Roads**																							0	0	0	0	0
9.1	Kerbing		1	2					1	1	1			3		2	1	5	2.5	6		10	2	90	0	100	10	0
9.2	Paths		1	2					1	1	1			3		2	1	10	2.5	6		10	2	180	0	200	20	0
9.3	Aggregate	4500	1						3	1	1			1	4	2		20	5	4	8	10	2	160	640	400	0	0
9.4	Surfacing		1						2			1		5		2		3	1	8		8	2	120	0	48	0	0
																								0	0	0	0	0
10	**Traffic Services/furniture**																							0	0	0	0	0
10.1	General		1	1					1	1	1			1		1	1	10	2.5	6		10	2	60	0	100	20	0
																								0	0	0	0	0
11	**Retaining Walls**																							0	0	0	0	0
11.1	Daly Street		1	2					2	1				2		1		20	10	4		8	2	160	0	160	0	0
11.2																								0	0	0	0	0
																								0	0	0	0	0
12	**Structures**																							0	0	0	0	0
12.1	Pedestrian Bridge	see separate																						0	0	0	0	0
12.2	Melling River Bridge	see separate																						0	0	0	0	0
12.3	Interchange Bridge	see separate																						0	0	0	0	0
12.4	Station and Platform	see separate																						0	0	0	0	0
																								0	0	0	0	0
13	**Landscaping**																							0	0	0	0	0
13.1	Landscaping		1	2					1	1				1		4	1	40	10	2		10	2	80	0	1600	80	0
																		178.75						7882.667	7503	15882.83	615.3833	0
																		Average per day						44.09883	41.97483	88.85501	3.442704	0
																		Peak per day										
																		250.25										

Riverlink Construction Resource

				Off Road Plant										On Road				Duration		Road Trips/Day				Total Trips				
Stage 3		Quantity	Unit	12t - 20t Excavator	30t plus Excavator	D6 Dozer or equivalent	8m3 Truck / Off Road Truck	Off Road Dumper	Compactor	2m3+ Loader	Grader	Paver		8m3 Truck	Truck and Trailer	Light Vehicle/ Ute/ Crew Cab	Plant Maintenance	days	Critical Path	8m3 Truck	Truck and Trailer	Light Vehicle/ Ute/ Crew Cab	Plant Maintenance	0	8m3 Truck	Truck and Trailer	Light Vehicle/ Ute/ Crew Cab	Plant Maintenance	0
1	**Preliminary and General**																												
1.1	Site Compound		1 ea																										
1.2	Plant establishment/Disestablishment		1 ea																										
2	Traffic Management																												
2.1	Traffic Management		1 day											2		2		104.5		10		20			2090	0	4180	0	0
																									0	0	0	0	0
3	**Environmental Controls**																								0	0	0	0	0
3.1	Establish ESC measures		1	1										1		1		5	2	4		10	2		20	0	50	0	0
3.2	Maintain ESC meaures		1	1												1		25				6	2		0	0	150	0	0
																									0	0			
4	**Site Clearance**																								0	0			
4.1	Building Demolition		0	1										2		1	1	2	10	8		4	2		0	0	0	0	0
4.2	Vegetation (Tree) removal		0	1			1									2	1	10				10	2		0	0	0	0	0
4.3	General Site Clearance		1	1		1	2									1	1	5	2			10	2		0	0	50	10	0
																									0	0			
5	**Services Protection and Diversion**																								0	0			
5.1	General		1	1			2									2	1	40				10	2		0	0	800	80	0
5.2	WWL WasterWater pipeline																								0	0	0	0	0
																									0	0	0	0	0
6	**Earthworks**	**m3**																							0	0	0	0	0
	Right Bank Downstream of bridge																								0	0			
6.1	Topsoil strip		0	2			4									2	1	5				10	2		0	0	0	0	0
6.2	Construct temporary flood protection measures		0	1		1			2					4		2	1	20		10		10	4		0	0	0	0	0
6.3	Deconstruction existing stopbank to bulk fill in new	60000	0.0	2	1	1		3	2					1		4	1	0		10		10	4		0	0	0	0	0
6.4	Cut to fill to new stopbank	120000	0	2	2	1		4	2					2		5	1	0		10		10	4		0	0	0	0	0
6.5	Cut to stockpile for processing	10000	0	2				2						2		2	1	0		10		10	2		0	0	0	0	0
6.6	Import to stopbank processed material	10000	0	1		1		2	2	1				1		2	1	0		10		10	2		0	0	0	0	0
6.7	Import material from off site (low permeability layer)	6750	0	1		1			2						6	2	1	0			10				0	0	0	0	0
6.8	Import material from off site (bulk fill)		0																						0	0	0	0	0
6.9	Import Topsoil	1500	0	1		1			2						4	2	1	0			10				0	0	0	0	0
6.10	Supply and Place Rip Rap	20000	0	1		1			2					8		2	1	0		10					0	0	0	0	0
6.11																									0	0	0	0	0
	Left Bank Downstream of bridge																								0	0			
6.1	Topsoil strip		0	2			4									2	1	5	5			10	2		0	0	0	0	0
6.2	Construct temporary flood protection measures		0	1		1			2					4		2	1	15	7.5	10		10	4		0	0	0	0	0
6.3	Deconstruction existing stopbank to bulk fill in new	45000	0.0	2	1	1		3	2					1		4	1	0	0	10		10	4		0	0	0	0	0
6.4	Cut to fill to new stopbank	20000	0	2	2	1		4	2					2		5	1	0	0	10		10	4		0	0	0	0	0
6.5	Cut to stockpile for processing	5000	0	2				2						2		2	1	0		10		10	2		0	0	0	0	0
6.6	Import to stopbank processed material	5000	0	1		1		2	2	1				1		2	1	0	0	10		10	2		0	0	0	0	0
6.7	Import material from off site (low permeability layer)	6750	0	1		1			2						6	2	1	0	0		10	10	2		0	0	0	0	0
6.8	Import material from off site (bulk fill)	135000	0.03	1		1			2						4	2	1	13.5	13.5		10	10			0	16.2	8.1	0	0
6.9	Import Topsoil	1000	0	1		1			2						4	2	1	0	0		10	10	2		0	0	0	0	0
6.10	Supply and Place Rip Rap	15000	0	1		1			2					8		2	1	0		10		10	2		0	0	0	0	0
6.11	Export Surplus to Rutherford Street/Queens Drive			2	2	1		5	2	1				1	1	5	1	0	0	10	10	10	2		0	0	0	0	0
6.12																		0	0						0	0	0	0	0
																									0	0	0	0	0
7	**Stormwater**																								0	0	0	0	0
7.1	Pump Station		1	1										2		2	1	30		2		10	2		120	0	600	60	0
7.2	General		1	2	1									3		3	1	20	5	6		10	2		360	0	600	40	0
																									0	0	0	0	0
8	**Misc Water and Waster protection/diversiosn**																								0	0	0	0	0
8.1	General		1	2										2		2	1	20	5	6		10	2		240	0	400	40	0
																									0	0	0	0	0
9	**Roads**																								0	0	0	0	0
9.1	Kerbing		1	2					1	1	1			3		2	1	5	5	6		10	2		90	0	100	10	0
9.2	Paths		1	2					1	1	1			3		2	1	10	10	6		10	2		180	0	200	20	0
9.3	Aggregate	4500	1						3	1	1			1	4	2		20	20	4	8	10	2		160	640	400	0	0
9.4	Surfacing		1						2			1		5		2		2	2	8		8	2		80	0	32	0	0
																									0	0	0	0	0
10	**Traffic Services/furniture**																								0	0	0	0	0
10.1	General		1	1					1	1	1			1		1	1	10	2.5	6		10	2		60	0	100	20	0
																									0	0	0	0	0
11	**Retaining Walls**																								0	0	0	0	0
11.1	Rutherford Street		1	2					2	1				2		1		20	10	4		8	2		160	0	160	0	0
11.2																									0	0	0	0	0
																									0	0	0	0	0
12	**Structures**																								0	0	0	0	0
12.1	Pedestrian Bridge	see separate																							0	0	0	0	0
12.2	Melling River Bridge	see separate																							0	0	0	0	0
12.3	Interchange Bridge	see separate																							0	0	0	0	0
12.4	Station and Platform	see separate																							0	0	0	0	0
																									0	0	0	0	0
13	**Landscaping**																								0	0	0	0	0
13.1	Landscaping		1	2					1	1				1		4	1	10	5	2		10	2		20	0	400	20	0
																		104.5							3580	656.2	8230.1	300	0
																		Average per day							34.25837	6.279426	78.75694	2.870813	0
																		Peak per day											
																		146.3											

Riverlink Construction Resource

				Off Road Plant										On Road				Duration		Road Trips/Day				Total Trips				
Stage 4		Quantity	Unit	12t - 20t Excavator	30t plus Excavator	D6 Dozer or equivalent	8m3 Truck / Off Road Truck	Off Road Dumper	Compactor	2m3+Loader	Grader	Paver		8m3 Truck	Truck and Trailer	Light Vehicle/ Ute/ Crew	Plant Maintenance	days	Critical Path	8m3 Truck	Truck and Trailer	Light Vehicle/ Ute/ Crew	Plant Maintenance	8m3 Truck	Truck and Trailer	Light Vehicle/ Ute/ Crew	Plant Maintenance	0
1	**Preliminary and General**																											
1.1	Site Compound		1 ea																									
1.2	Plant establishment/Disestablishment		1 ea																									
2	Traffic Management																											
2.1	Traffic Management		1 day											2		2		147.3333		10		20		2946.667	0	5893.333	0	0
																								0	0	0	0	0
3	**Environmental Controls**																							0	0	0	0	0
3.1	Establish ESC measures		1	1										1		1		5	2	4		10	2	20	0	50	0	0
3.2	Maintain ESC meaures		1	1												1		25				6	2	0	0	150	0	0
																								0	0			
4	**Site Clearance**																							0	0			
4.1	Building Demolition		3	1										2		1	1	2	0	8		4	2	96	0	24	12	0
4.2	Vegetation (Tree) removal		1	1			1									2	1	5				10	2	0	0	100	10	0
4.3	General Site Clearance		1	1		1	2									1	1	5	2			10	2	0	0	50	10	0
																								0	0			
5	**Services Protection and Diversion**																							0	0			
5.1	General		1	1			2									2	1	40	5			10	2	0	0	800	80	0
5.2	WWL WasterWater pipeline																							0	0	0	0	0
																								0	0	0	0	0
6	**Earthworks**	**m3**																						0	0	0	0	0
	Right Bank Downstream of bridge																							0	0			
6.1	Topsoil strip		0.1	2			4									2	1	5				10	2	0	0	10	1	0
6.2	Construct temporary flood protection measures		0.1	1		1			2					4		2	1	20		10		10	4	80	0	40	8	0
6.3	Deconstruction existing stopbank to bulk fill in new	60000	0.1	2	1	1		3	2					1		4	1	3		10		10	4	3	0	12	1.2	0
6.4	Cut to fill to new stopbank	120000	0.1	2	2	1		4	2					2		5	1	3		10		10	4	6	0	15	1.2	0
6.5	Cut to stockpile for processing	10000	0.1	2				2						2		2	1	0.5		10		10	2	1	0	1	0.1	0
6.6	Import to stopbank processed material	10000	0.1	1		1		2	2	1				1		2	1	0.666667		10		10	2	0.666667	0	1.333333	0.133333	0
6.7	Import material from off site (low permeability layer)	6750	0.1	1		1			2						6	2	1	1.5			10			0	9	0	0	0
6.8	Import material from off site (bulk fill)		0.1																					0	0	0	0	0
6.9	Import Topsoil	1500	0.1	1		1			2						4	2	1	0.5			10			0	2	0	0	0
6.10	Supply and Place Rip Rap	20000	0.1	1		1			2					8		2	1	6.25		10				50	0	0	0	0
6.11																								0	0	0	0	0
	Left Bank Downstream of bridge																							0	0			
6.1	Topsoil strip		0	2			4									2	1	0	0			10	2	0	0	0	0	0
6.2	Construct temporary flood protection measures		0	1		1			2					4		2	1	0	0	10		10	4	0	0	0	0	0
6.3	Deconstruction existing stopbank to bulk fill in new	45000	0.0	2	1	1		3	2					1		4	1	0	0	10		10	4	0	0	0	0	0
6.4	Cut to fill to new stopbank	20000	0	2	2	1		4	2					2		5	1	0	0	10		10	4	0	0	0	0	0
6.5	Cut to stockpile for processing	5000	0	2				2						2		2	1	0		10		10	2	0	0	0	0	0
6.6	Import to stopbank processed material	5000	0	1		1		2	2	1				1		2	1	0	0	10		10	2	0	0	0	0	0
6.7	Import material from off site (low permeability layer)	6750	0	1		1			2						6	2	1	0	0		10	10	2	0	0	0	0	0
6.8	Import material from off site (bulk fill)	135000	0	1		1			2						4	2	1	0	0		10	10		0	0	0	0	0
6.9	Import Topsoil	1000	0	1		1			2						4	2	1	0	0		10	10	2	0	0	0	0	0
6.10	Supply and Place Rip Rap	15000	0	1		1			2					8		2	1	0		10		10	2	0	0	0	0	0
6.11	Export Surplus to Rutherford Street/Queens Drive			2	2	1		5	2	1				1	1	5	1	0	0	10	10	10	2	0	0	0	0	0
6.12																		0	0					0	0	0	0	0
																								0	0	0	0	0
	Melling Interchange Embankments																							0	0			
6.1	Topsoil strip		1	2			4									2	1	5	5			10	2	0	0	100	10	0
6.2	Construct temporary flood protection measures		0	1		1			2					4		2	1	15	7.5	10		10	4	0	0	0	0	0
6.3	Deconstruction existing stopbank to bulk fill in new		0.0	2	1	1		3	2					1		4	1	0	0	10		10	4	0	0	0	0	0
6.4	Cut to fill to new stopbank		0	2	2	1		4	2					2		5	1	0	0	10		10	4	0	0	0	0	0
6.5	Cut to stockpile for processing		0	2				2						2		2	1	0		10		10	2	0	0	0	0	0
6.6	Import to stopbank processed material		0	1		1		2	2	1				1		2	1	0	0	10		10	2	0	0	0	0	0
6.7	Import material from off site (low permeability layer)		0	1		1			2						6	2	1	0	0		10	10	2	0	0	0	0	0
6.8	Import material from off site (bulk fill)	75000	1	1		1			2						12	2	1	83.33333	41.66667		10	10		0	10000	1666.667	0	0
6.9	Import Topsoil	500	1	1		1			2						2	2	1	3.333333	1.666667		10	10	2	0	66.66667	66.66667	6.666667	0
6.10	Supply and Place Rip Rap		0	1		1			2					8		2	1	0		10		10	2	0	0	0	0	0
6.11	Export Surplus to Rutherford Street/Queens Drive			2	2	1		5	2	1				1	1	5	1	0	0	10	10	10	2	0	0	0	0	0
6.12																		0	0					0	0	0	0	0
7	**Stormwater**																							0	0	0	0	0
7.1	Pump Station		0	1										2		2	1	30		2		10	2	0	0	0	0	0
7.2	General		1	2	1									3		3	1	20	10	6		10	2	360	0	600	40	0
																								0	0	0	0	0
8	**Misc Water and Waster protection/diversiosn**																							0	0	0	0	0
8.1	General		1	2										2		2	1	20	5	6		10	2	240	0	400	40	0
																								0	0	0	0	0
9	**Roads**																							0	0	0	0	0
9.1	Kerbing		1	2					1	1	1			3		2	1	5	5	6		10	2	90	0	100	10	0
9.2	Paths		1	2					1	1	1			3		2	1	5	5	6		10	2	90	0	100	10	0
9.3	Aggregate	18900	1						3	1	1			1	6	2		60	40	4	8	10	2	480	2880	1200	0	0
9.4	Surfacing		1						2				1	5		2		3	0	8		8	2	120	0	48	0	0
																								0	0	0	0	0
10	**Traffic Services/furniture**																							0	0	0	0	0
10.1	General		1	1					1	1	1			1		1	1	10	2.5	6		10	2	60	0	100	20	0
																								0	0	0	0	0
11	**Retaining Walls**																							0	0	0	0	0
11.1	Melling		1	2					2	1				2		1		20	10	4		8	2	160	0	160	0	0
11.2																								0	0	0	0	0
																								0	0	0	0	0
12	**Structures**																							0	0	0	0	0
12.1	Pedestrian Bridge	see separate																						0	0	0	0	0
12.2	Melling River Bridge	see separate																						0	0	0	0	0
12.3	Interchange Bridge	see separate																						0	0	0	0	0
12.4	Station and Platform	see separate																						0	0	0	0	0
																								0	0	0	0	0
13	**Landscaping**																							0	0	0	0	0
13.1	Landscaping		1	2					1	1				1		4	1	10	5	2		10	2	20	0	400	20	0
																		147.3333						4823.333	12957.67	12088	280.3	0
																		Average per day						32.73756	87.94796	82.04525	1.902489	0
																		Peak per day										
																		206.2667										

Appendix K Construction parking impacts

		Enabling Works				
Affected Area	**Number of Car Parks Affected**	**Affected during stage**	**Reinstated/ Replaced at end of stage'**	**# at end of stage**	**Cumulative reduction at end of stage**	**Comment**
Block Road	21			21	0	
Daly Street	62	31	31	62	0	Assume 50% during building demolition
Existing Train Station Car Park	187			187	0	
New Train Station Car Park	0			0	0	
Harvey Norman Car Park	103			103	0	
High Street	8			8	0	
Marsden Street	38	0	38	38	0	Assume existing parking able to be retained.
New Marsden Street Carpark	0			0	0	
Marsden Street Hutt City Church	40	0		40	0	
Melling Rd & Car Park	6			6	0	
Mills Street	12			12	0	
Pharazyn Street	130	35	35	130	0	Assume 25% during building demolition
Dudley Street	18	18	0	0	18	
Queens Drive	2			2	0	
Riverside Car Park	854			854	0	
Rutherford Street	19			19	0	
HCC Riverside Development	0		150	150	-150	
Total		84	254		-132	

Stage 1

Affected Area	Number of Car Parks Affected	Affected during stage	Reinstated/ Replaced at end of stage'	# at end of stage	Cumulative reduction at end of stage	Comment
Block Road	21	10	0	11	10	At location of new river bridge
Daly Street	62			62	0	
Existing Train Station Car Park	187	10	0	177	10	At location of new river bridge
New Train Station Car Park	0			0	0	
Harvey Norman Car Park	103	103	0	0	103	Cut off by new bridge construction utilised as staging area
High Street	8			8	0	
Marsden Street	38	10	83	83	-45	Tie-ins of realignment
New Marsden Street Carpark	0		30	30	-30	Public or Private access to be confirmed
Marsden Street Hutt City Church	40	40	30	30	10	Uncontrolled parking area
Melling Rd & Car Park	6			6	0	
Mills Street	12	12		0	12	Will occur with adjacent stopbank which could be in any stage
Pharazyn Street	130			130	0	
Dudley Street	18			0	18	
Queens Drive	2			2	0	
Riverside Car Park	854			854	0	
Rutherford Street	19			19	0	
HCC Riverside Development	0			150	-150	
Total		185	143		-62	

		Stage 2				
Affected Area	**Number of Car Parks Affected**	**Affected during stage**	**Reinstated/ Replaced at end of stage'**	**# at end of stage**	**Cumulative reduction at end of stage**	**Comment**
Block Road	21			11	10	
Daly Street	62	62		0	62	
Existing Train Station Car Park	187			177	10	
New Train Station Car Park	0			0	0	
Harvey Norman Car Park	103			0	103	
High Street	8	4	4	8	0	For during on intersection improvement only
Marsden Street	38	12		83	-45	construction of temporary works at intersection with Pharazyn St
New Marsden Street Carpark	0			30	-30	
Marsden Street Hutt City Church	40			30	10	
Melling Rd & Car Park	6			6	0	
Mills Street	12			0	12	
Pharazyn Street	130	4		130	0	construction of temporary works at intersection with Marsden St
Dudley Street	18			0	18	
Queens Drive	2			2	0	
Riverside Car Park	854	665	247	436	418	Length from Andrews Ave roundabout to new river bridge
Rutherford Street	19			19	0	
HCC Riverside Development	0			150	-150	
Total		747	251		418	

Stage 3

Affected Area	Number of Car Parks Affected	Affected during stage	Reinstated/ Replaced at end of stage'	# at end of stage	Cumulative reduction at end of stage	Comment
Block Road	21			0	21	
Daly Street	62			0	62	
Existing Train Station Car Park	187			177	10	
New Train Station Car Park	0		201	201	-201	Assumed only at end of Stage. Potential for this to be opened earlier in stage.
Harvey Norman Car Park	103			0	103	
High Street	8			0	8	
Marsden Street	38			83	-45	
New Marsden Street Carpark	0			30	-30	
Marsden Street Hutt City Church	40			30	10	
Melling Rd & Car Park	6			6	0	
Mills Street	12			0	12	
Pharazyn Street	130	130		34	96	
Dudley Street	18			0	18	
Queens Drive	2	2		0	2	
Riverside Car Park	854		40	420	434	Remaining Parks under bridge
Rutherford Street	19	14	10	15	4	
HCC Riverside Development	0			150	-150	
Total		146	251		354	

		Stage 4				
Affected Area	**Number of Car Parks Affected**	**Affected during stage**	**Reinstated/ Replaced at end of stage'**	**# at end of stage**	**Cumulative reduction at end of stage**	**Comment**
Block Road	21			0	21	
Daly Street	62			0	62	
Existing Train Station Car Park	187	177		0	187	
New Train Station Car Park	0			201	-201	
Harvey Norman Car Park	103			0	103	
High Street	8			0	8	
Marsden Street	38			83	-45	
New Marsden Street Carpark	0			30	-30	
Marsden Street Hutt City Church	40			30	10	
Melling Rd & Car Park	6			6	0	
Mills Street	12			0	12	
Pharazyn Street	130			34	96	
Dudley Street	18			0	18	
Queens Drive	2			0	2	
Riverside Car Park	854	89		420	434	Assumes access to these has been maintained through earlier stages
Rutherford Street	19			15	4	
HCC Riverside Development	0			150	-150	
Total		266	0		531	

Stage 7

Affected Area	Number of Car Parks Affected	Affected during stage	Reinstated/ Replaced at end of stage'	# at end of stage	Cumulative reduction at end of stage	Comment
Block Road	21			0	21	
Daly Street	62			0	62	
Existing Train Station Car Park	187			0	187	
New Train Station Car Park	0			201	-201	
Harvey Norman Car Park	103			0	103	
High Street	8			0	8	
Marsden Street	38			83	-45	
New Marsden Street Carpark	0			30	-30	
Marsden Street Hutt City Church	40			30	10	
Melling Rd & Car Park	6	6	6	6	0	
Mills Street	12			0	12	
Pharazyn Street	130			34	96	
Dudley Street	18			0	18	
Queens Drive	2			0	2	
Riverside Car Park	854			420	434	Assumes access to these has been maintained through earlier stages
Rutherford Street	19	4	4	15	4	
HCC Riverside Development	0			150	-150	
Total		10	10		531	
					681	