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Report

Prince of Wales/Omāroro Reservoir Transport Assessment

Prepared for Wellington Water Ltd

Prepared by CH2M Beca Ltd

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Revision History

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Action	Name	Signed	Date
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on behalf of	CH2M Beca Ltd		

Executive Summary

Beca Ltd has been commissioned by Wellington Water to undertake a transport assessment to identify any transportation, traffic and road network effects arising from the construction of a buried 35,000 m3 reservoir to be built in the Prince of Wales Park.

This reservoir (Prince of Wales/Omāroro Reservoir) will service the Wellington Low Level Water Supply Zone covering the Wellington central business district, Newtown, and Mount Cook. It will add water storage capacity to this water supply zone that provides for long term residential and business growth within this zone, supports the effective long term management and maintenance of the zone's water storage network, and significantly enhances the zone's resilience to both temporary and significant water supply disruption events, such as may be associated with a natural hazard event. It is expected that once construction begins, Prince of Wales/Omāroro Reservoir (the reservoir) will take approximately two years to build. Subject to funding and obtaining required approvals and consents, the reservoir potentially could be completed by 2021.

The preliminary construction methodology involves two potential options. Both options are considered in this assessment.

- Option 1, involves the preliminary construction methodology developed during the preliminary design stage in 2013, involving the production of a significant quantity of surplus excavated material (approximately 31,000 m3 of insitu material) that will need to be taken off site for disposal
- Option 2, involves an alternative construction methodology that includes retaining a significant quantity of surplus excavated material on site for use in raising the Prince of Wales Park upper and lower sports fields by up to 1.5 metres.

It is proposed that during construction Rolleston Street will be used as the primary point of access. Heavy vehicles will aim to use this street during 9am to 3pm, Monday to Friday and 7:30am – 6pm Saturday in order to reduce inconvenience to residents and businesses. Some specialist heavy vehicle movements, associated with the delivery and removal of specialised machinery and the delivery of specialised pre-constructed components to the site, may need to occur outside of these hours (weekends or evenings).

It is also proposed that staff vehicles, and some smaller service vehicles, will generally access the site by way of Wright Street and Salisbury Terrace. They will utilise existing car parking or dedicated temporary parking provided on-site on the lower (southern) Prince of Wales sports field.

Vehicle tracking using a 9 m rigid truck and 19 m truck has demonstrated that in order in ensure safe entry/ exit of heavy vehicles into Rolleston Street, via the Rolleston Street / Wallace Street intersection, between 20-23 on-street residential parking spaces will have to be temporarily removed during the duration of the works. It is proposed, with the agreement of Wellington City Council (WCC), that where residential on-street parking needs to be removed coupon parking spaces on Rolleston Street are reallocated to residential parking.

The assessment provided by this report also shows that the effects of the construction of the Reservoir on the transport network are varied and wide ranging, and vary according to the extent to which excavated material needs to be transported from the site for disposal.

Even if excavated material from the reservoir site cannot be retained on site for raising fields, the effects on the transport network are not significant in standard transportation assessment terms. A number of mitigation measures have been recommended to ensure the transport network continues to function effectively during construction. The recommended mitigation measures include:

- Use of Rolleston Street as the primary heavy vehicle access for the construction site. This is the most appropriate adjoining road for heavy vehicle access
- Restrict heavy vehicle access to and from the site to outside of peak commute hours
- Restrict the size of heavy vehicles that are able to remove excavated materials from the site during excavation periods. By doing so the need for manual traffic control and the Wallace Street / Rolleston Street intersection will be greatly reduced
- Some larger heavy vehicles will be required for pre-cast concrete deliveries and to deliver and remove specialised machinery from the site. These will be timed for off peak periods and have manual traffic controllers on-site to enable them to enter / exit the Rolleston Street / Wallace Street intersection
- Use of Salisbury Terrace as the access for light vehicles and workers to and from site. This will mean construction traffic isn't concentrated on Rolleston Street and adverse effects of the additional construction traffic will be spread wider over the network
- Temporarily remove car parks from specified areas along Rolleston Street to allow for heavy vehicles to safely manoeuvre into and out of the Rolleston Street / Wallace Street intersection and along Rolleston Street. These car parks will be reinstated to Wellington City Council's requirements once the reservoir development is completed
- Provide a small, formed, temporary car park area for displaced on-street car parks. This will be located off Rolleston Street on the existing upper Prince of Wales sport field, adjacent to the construction site. This area will be reinstated to playing fields once the reservoir development is completed
- Introduce a temporary speed restriction of 30 kph on Rolleston Street throughout the construction period
- A specific heavy vehicle route to and from site has been recommended. This route utilises the major roads on the network to limit the effects of heavy vehicle movements to roads which serve for this purpose and currently experience these effects
- The development and approval of a Construction Traffic Management Plan (CTMP) which further details these mitigation measures and traffic management process for the construction phase.

An on-street parking survey was undertaken has shown that there is sufficient capacity on the surrounding streets to meet the demand for day-time parking of workers and students. Heavy vehicle movements to and from site have been tested and shown to be possible with only minor changes to car parks on Rolleston Street. Overall, there will be a minor impact on parking for local residents and a less than minor impact for the wider community.

A temporary speed limit on Rolleston Street will give all road users more time to react should a collision be imminent. It will mean that speeds travelled will be more forgiving.

Pavement and seal maintenance will be undertaken by the physical works contractor throughout the construction period. This will occur to ensure Rolleston Street remains safe, efficient and fit for purpose during the construction period.

Modelling has shown that the effect on the traffic flows – including peak heavy vehicle movements to and from site – at the Wallace Street / Rolleston Street and Wallace Street / Bidwill Street intersections is less than minor. Outside of the immediate area, the effects of the construction traffic will likely not be noticed.

Given the implementation of the mitigation measures above, the construction of the Prince of Wales/Omāroro Reservoir will have a less than minor impact on the transport network.

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1 Background

Wellington Water are seeking to construct a buried 35,000 m3 concrete reservoir within the Wellington Town Belt and situated above the upper field of the Prince of Wales Park in Mount Cook. The reservoir (Prince of Wales / Omāroro Reservoir) will service the Wellington Low Level Water Supply Zone covering the Wellington central business district, Newtown, and Mount Cook. It will add water storage capacity to this water supply zone that provides for long term residential and business growth within this zone, supports the effective long term management and maintenance of the zone's water storage network, and significantly enhances the zone's resilience to both temporary and significant water supply disruption events, such as may be associated with a natural hazard event. It is expected that once construction begins, the Prince of Wales/Omāroro Reservoir (the reservoir) will take approximately two years to build. Subject to funding and obtaining required approvals and consents, the proposed reservoir could be completed by 2021.

1.1 Purpose of Report

The purpose of this report is to identify transportation, traffic and road network effects that will arise from the construction and operation of the reservoir. Where there are negative impacts that are considered more than minor, mitigation methods are identified. This is to ensure that the construction of the reservoir does not unduly affect road users, and the surrounding communities.

2 Existing Transport Environment

2.1 Location

The proposed reservoir is to be constructed between the upper and lower fields of the Prince of Wales Park. The park is located within the Mount Cook suburb of Wellington City. The location of the reservoir is shown in Figure 2-1.

The Prince of Wales Park is bordered and accessed from a number of surrounding roads. Rolleston Street and Hargreaves Street to the north, Papawai Terrace and Salisbury Terrace to the east and Bell Road and Dorking Road to the west.

The Prince of Wales Park has a number of walking tracks that run through the park. These include part of the City to Sea walkway, which runs from north to south through the park. The proposed reservoir site is also part of the Wellington Town Belt. The Wellington Town Belt is a large area of open space providing a scenic backdrop to the inner city and offering recreational opportunities.

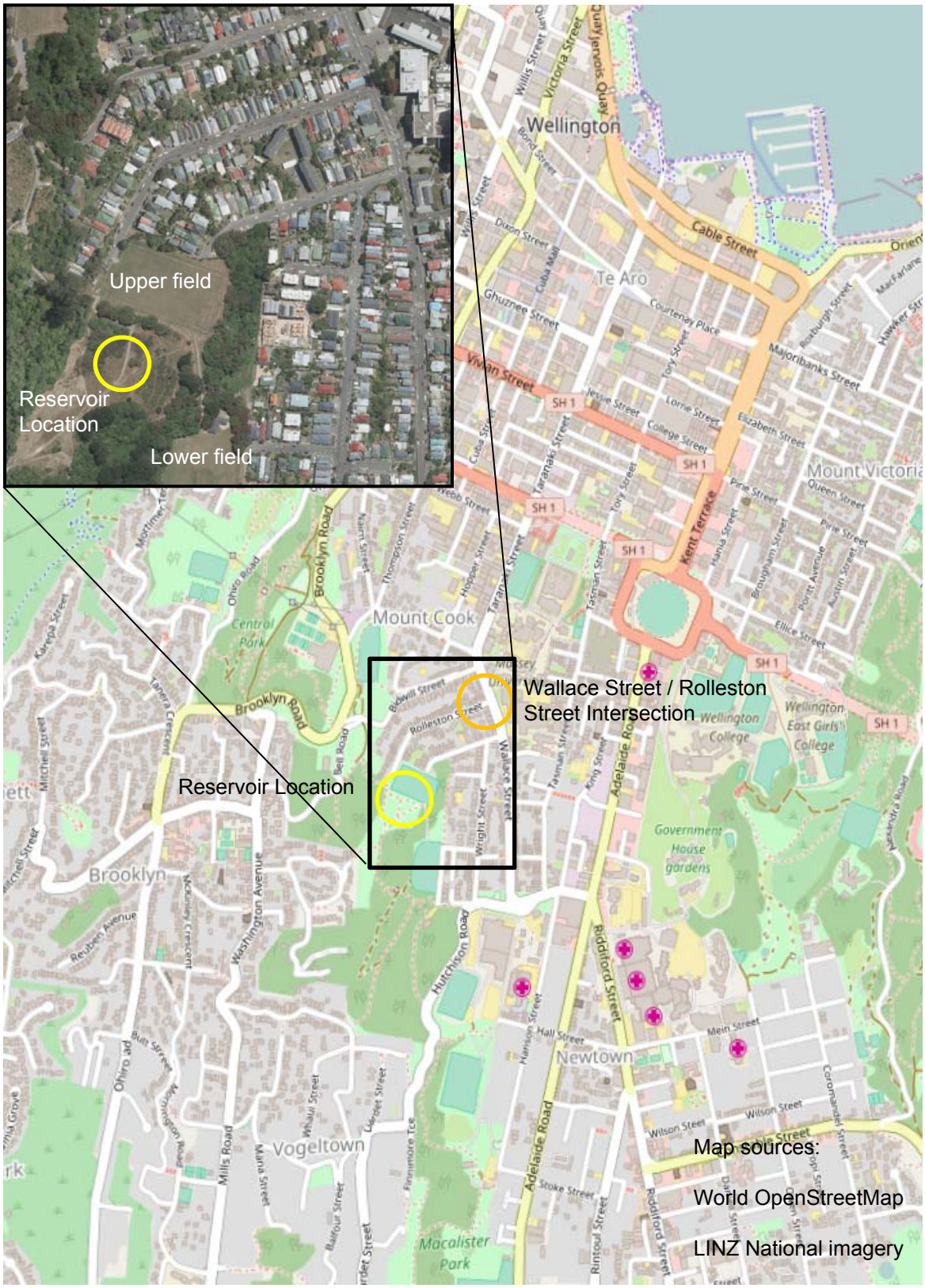


Figure 2-1: Reservoir Location Map

2.2 Rolleston Street

Rolleston Street is a dead-end residential road, which is between seven and nine metres wide that runs from Wallace Street, at its eastern end, to where it connects to the Prince of Wales Park, at its southern end. It has a steep grade up from Wallace Street. It has footpaths and on-street parking on both sides of the road. Rolleston Street has an annual average daily traffic flow (AADT) of approximately 600 (June 2010) vehicles per day.

Rolleston Street will be the primary point of access for all construction activities for the duration of the project. Other access points were considered, such as Bidwell Street, Hargreaves Street and Bell Road, but Rolleston Street provided the most convenient route to the construction site and the mitigation measures were more workable utilising Rolleston Street than for the alternatives.

2.2.1 Traffic Counts

Wellington City Council (WCC) undertakes regular counts on its road network. These counts were made available for Wallace Street, Rolleston Street and other surrounding local roads. The most recent counts made available for Rolleston Street were undertaken for the week beginning 23 June 2010. Although there has been a significant period of time since the counts were undertaken, the land use on Rolleston Street, and surrounding roads has not changed in this time period, therefore traffic patterns and numbers of vehicles using Rolleston Street would have remained similar across that period and for the purposes of this draft assessment the 2010 count was considered suitable.

Rolleston Street has an average 5-day (Monday to Friday) AADT of 552 vehicles per day (June 2010). Details of the hourly traffic counts can be found in **Appendix A.**

2.2.2 On Street Parking

Parking on Rolleston Street is designated as either ‘Resident Parking’ or ‘Coupon Parking’. To park in resident parking a residents permit needs to be displayed. Coupon parking allows for 2 hours of free parking after which a parking coupon is required.

During a site visit in December 2016 it was observed that there are approximately 77 on-street car parks that are available for use by residents and other road users. These car parks are designated as follows:

- 26 residents car parks
- 44 coupon car parks
- 7 un-designated car parks at top of Rolleston Street (though likely to be enforced as coupon car parks).

There are also 12 car parks on private property alongside Rolleston Street. These are designated as private car parks and therefore are not included in the count above. It should also be noted that not all residential properties on the street have off-street parking so rely on the residential parking spaces.

It was also observed while on site that vehicles tended to park across entrances to residential properties. This could indicate that residents may be illegally parking across their own entrance to maximise the available space. While this cannot be relied on when counting total potential car parking opportunities, it does mean that more vehicles could be wanting to park on Rolleston Street than there are legal spaces available for.

a. Parking Survey

A parking survey of Rolleston and surrounding Streets was undertaken between 12pm and 1pm on Thursday 9 March and 5am and 6am on Friday 10 March. These two survey times were selected to

capture on-street parking utilisation for residents overnight, and in the middle of the day when parks are being used by workers and students.

Between 5am and 6am on-street car park utilisation on Rolleston Street was 82% overall. 'Residents' car parks had a slightly higher utilisation of 88% with 'Coupon' car parks at 78%. Overall there were 14 free car parks counted on Rolleston Street during this period.

Between 12pm and 1pm on-street car park utilisation on Rolleston Street was 75% overall. 'Residents' car parks utilisation was in line with this at 73% with 'Coupon' car parks at 76%. Overall there were 20 free car parks counted on Rolleston Street during this period. There is little difference between daytime and night-time parking on Rolleston Street. With available capacity during both periods.

It was also noted during both parking survey periods that there were vehicles parked across driveways. During the 12pm – 1pm period there were five vehicles counted as being parked across a driveway.

Assessment of parking capacity and demand surrounding Rolleston Street is included in Section 2.5 below.

2.3 Wallace Street / Rolleston Street Intersection

The Wallace Street / Rolleston Street intersection is a geometrically tight give way controlled T-intersection. Wallace Street is a two-lane, two way, Collector road with footpaths and some limited on-street parking on both sides of the road. Wallace Street has an average 5-day AADT of 20,950 vehicles per day (June 2016) with 3% heavy vehicles.

Figure 2-2: Rolleston Street/ Wallace Street Intersection

2.3.1 Traffic Counts

a. Wallace Street counts

The Wallace Street counts were undertaken over the week beginning 24 June 2016. The count was undertaken approximately 50 metres south of the Rolleston Street intersection. The peak flow in each direction occurs during the PM peak commute period of between 4pm-6pm.

There is a greater number of vehicles that use the road in the southbound direction (11,630 5-day [Monday to Friday] average) compared to in the northbound direction (9,320 5-day average). Detailed hourly traffic flow rate information can be found in **Appendix A.**

b. Intersection movements counts

Counts of all traffic movements at the intersection were undertaken between 2pm and 6pm on Thursday 9 March and between 7am and 11am on Friday 10 March. The intersection movement counts for two time periods (9am – 10am & 3pm – 4pm) are shown in Figures 2-3 and 2-4 below. These time periods were used for the modelling as these times were periods with the largest traffic flows outside of the peak periods in which heavy vehicles movements to and from site would be made. The top number in the figures is the number of light vehicles and the bottom number is the number of heavy vehicles and buses.

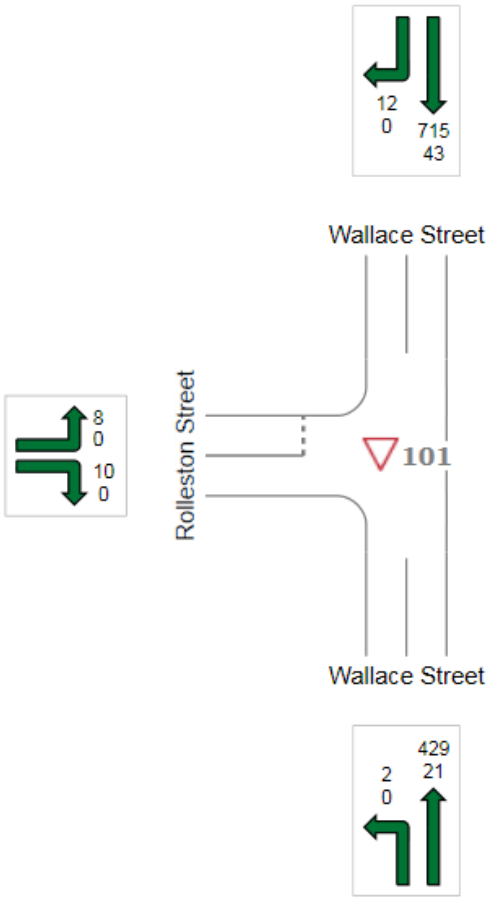


Figure 2-3: Wallace Street / Rolleston Street movement counts 9am - 10am

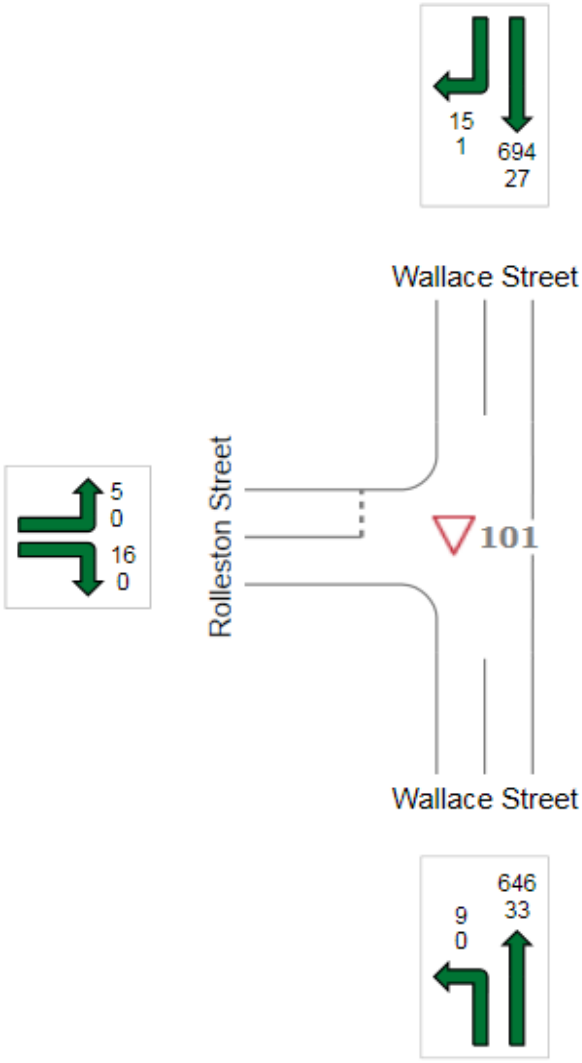


Figure 2-4: Wallace Street / Rolleston Street movement counts 3pm - 4pm

The survey results reveal that across all the periods counted, the predominant movement out of Rolleston Street is the right turn. This was the case during both the morning count period and afternoon count period.

The movement counts also confirmed that even though the counts on Rolleston Street are close to seven years old, they are still appropriate to use. The counts taken in March 2017 include a similar number of vehicles across the same time periods as the June 2010 traffic count.

2.4 Bidwill/Wallace Street Intersection

Bidwill Street / Wallace Street intersection is a four-way signalised intersection. All approaches have signal controlled pedestrian crossings. Bidwill Street is a low volume, two-way, two lane road with an average 5-day AADT of 3,500 vehicles (June 2016). The eastern leg of the intersection connects into the Wellington High School. The intersection is shown in **Figure 2-5**.

Figure 2-5: Bidwill Street/ Wallace Street intersection

2.5 Surrounding Road Network – Parking

A parking survey was undertaken on March 9 between 12pm and 1pm and on March 10 between 5am and 6am. The extent of the survey was to capture the roads within 500 metres (a short walking distance) of Rolleston Street. Figure 2-6 below shows the approximate extent of the parking survey. The raw parking survey counts are shown in **Appendix E**.

Figure 2-6: Approximate Extent of Parking Survey

The purpose of the parking survey was to ascertain the utilisation of the on-street car parks in the area and the potential capacity to take vehicles that would have otherwise parked on Rolleston Street should car parks be required to be removed.

Overall car park utilisation for all areas counted during the surveys was 73 percent and 61 percent during the early morning and midday time periods respectively. The two streets nearest to Rolleston Street – Bidwill Street and Hargreaves Street – had a car park utilisation of 58 percent and 45 percent during the early morning and midday time periods respectively.

There were close to 120 empty car parks during the midday survey of the area, more than half of which were 'Coupon' car parks. Hargreaves Street (22), Rolleston Street (13) and Bidwill Street (11) had the most available 'Coupon' car parks during that midday period.

2.6 Public Transport & Active Modes

2.6.1 Existing Bus Services

There are several bus stops in close proximity to the site. Bus stops are highlighted in Figure 2-7 below. Bus routes 10 and 11 run every 10 minutes in peak times and 20 minutes off-peak times, which go to Wellington CBD. The location of the bus–stops will not be affected during the construction phases of the project.

Figure 2-7: Existing Bus Services

2.6.2 Walking Network

Footpaths are available along both sides of Rolleston Street, Wallace Street and Hargreaves Street.

Walking paths for both commuters and recreational users are available through the town belt. These existing pathways run through what will be the Reservoir construction site. These existing pathways are shown as the dotted lines on the figure in **Appendix C**.

2.6.3 Cycle network

The numbers of cyclists that travel through the Wallace Street / Rolleston Street intersection was counted along with the vehicle counts undertaken on the 9th and 10th March 2017. 96 percent (131 of 136) of cycle movements observed at the intersection were from cyclists travelling on Wallace Street. The other five movements were cyclists turning into or out of Rolleston Street.

Although there are no dedicated cycle lanes available in the immediate vicinity of the site, there are cycle trails surrounding the park as shown in Figure 2-8 below. As the surrounding area is urban and residential, on-road cyclists are expected and should be considered.

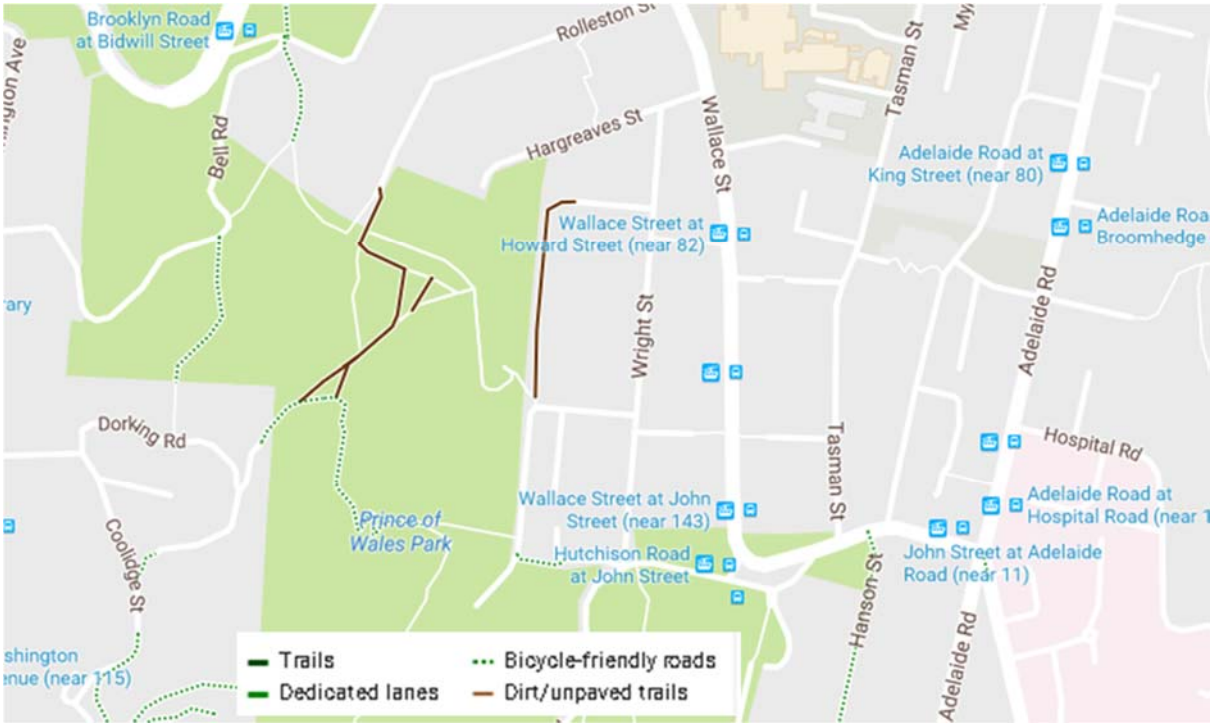


Figure 2-8: Existing Cycle Network

2.7 Existing Crash Record

A search of the NZ Transport Agency Crash Analysis System (CAS) has been undertaken to identify any existing road safety issues in the vicinity of the site represented by the latest 5 years (2012-2016) of available data. There were no recorded crashes for January to March 2017 on or in the vicinity of Rolleston Street. This search shows a total of 33 crashes in the Rolleston Street and Wallace Street area shown in Figure 2-8. This search shows no record of any fatal crashes, two serious crashes and four minor injury crashes recorded. The coded crash CAS output is contained in **Appendix C.**

One of the serious injury crash occurred in 2014 adjacent to the pedestrian crossing on Wallace Street between Rolleston Street and Hargreaves Street. A vehicle failed to stop when a moped in front stopped for a pedestrian crossing. The moped was struck and the driver suffered a serious

injury. The second serious injury crash occurred at the Wallace Street / Bidwill Street intersection. A motorcycle travelling east on Bidwill Street hit the rear of a stopped vehicle causing the injury.

The minor injury crashes occurred across a range of times of day and locations within the area. Three of the minor injury crashes involved a vehicle failing to notice the intentions of another party. This resulted in nose to tail type impacts. The other minor injury crash involved a pedestrian near the pedestrian crossing on Wallace Street between Rolleston Street and Hargreaves Street. The pedestrian was recorded to have been crossing heedless of traffic.

There were four crashes involving vulnerable road users in the crash record area (including the two injury crashes mentioned above). The other two such crashes involved cyclists being struck by other vehicles at or near the intersection of Wallace Street and Hargreaves Street. There were no crashes involving vulnerable road users on Rolleston Street or at the intersection of Wallace Street and Rolleston Street.

Two of the 33 recorded crashes were shown to have involved a truck. One of these crashes resulted in a minor injury. All three of the crashes occurred at the Wallace Street / Bidwill Street intersection.

There was two recorded non-injury crashes on Rolleston Street from 2012-2016. The ten year crash record (2007-2016) was therefore investigated to see if there were any other crash trends. There were six crashes on Rolleston Street in that ten year period, of which one was a minor injury crash. Five of the six of the crashes involved collisions between one vehicle and another parked vehicle. The sixth crash had one vehicle pull out of a driveway into another in the traffic lane.

The ten year crash record was also investigated for crashes at the Wallace Street / Rolleston Street intersection. There were five crashes during this time with one minor injury crash and the rest non-injury. Four of the five crashes at the intersection were rear end type crashes on Wallace Street where there was a queue from either the traffic signals or pedestrian crossing. There were no crossing or turning type crashes recorded in the past ten years.

Figure 2-9: Crash Analysis Study Area

There are no significant trends with regards to crashes involving trucks, crashes involving vulnerable road users. Crashes on Rolleston Street have happened predominantly when one vehicle is manoeuvring. This is likely a result of the narrow road width and large amount of on-street parking. The crashes at the Wallace Street / Rolleston Street intersection are mainly as a result of various stoppages upstream on Wallace Street.

Urban KiwiRAP – Risk Analysis

In addition to interrogating the CAS Database the Urban KiwiRAP ratings for Wallace Street and Rolleston Street has been obtained. The Urban KiwiRAP risk score uses the crash history and road characteristics to estimate the likelihood of serious incidents in the future. The higher the Collective Risk score, the greater the probability a fatal or serious injury crash will occur in future. Figure 2-10 below indicates Wallace Street has a medium-high Collective Risk whereas Rolleston Street has a low Collective Risk.

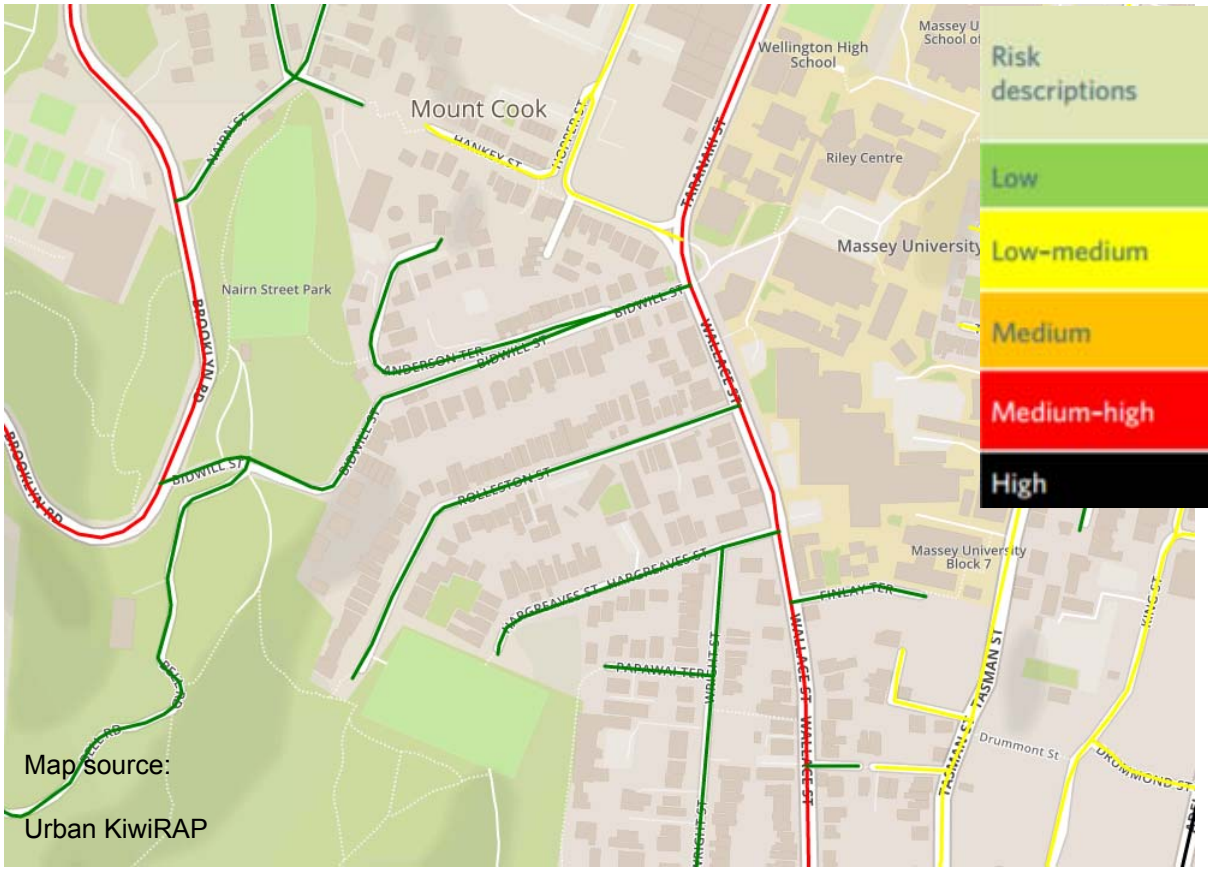


Figure 2-10: Urban KiwiRAP Collective Risk Map

3 Proposal Details

3.1 Construction Methodology

The full construction methodology will be developed by the contractor once they are selected to undertake the physical works. The preliminary construction methodology involves two potential options. Both options are considered in this assessment.

Option 1, involves the preliminary construction methodology developed during the preliminary design stage in 2013 attached in **Appendix D**, involving the production of a significant quantity of surplus excavated material (approximately 31,000 m3 of insitu material) that will need to be taken off site for disposal.

Option 2, involves an alternative construction methodology that includes retaining a significant quantity of surplus excavated material on site for use in raising the Prince of Wales Park upper and lower sports fields by up to 1.5 metres.

Under this second scenario some excess excavated material will still be required to be disposed off-site, however this will be significantly less that what is require under Option 1. For the purpose of this assessment it is assumed this surplus excess could be up to 18,000 m3.

3.2 Construction Site Entrance

As part of the Parks and Surplus Material Options Assessment Report a review was made of potential site access options for heavy vehicles and it appears using Rolleston Street is the only practical access available. Extending the Bell Road Reservoir access track through the Town Belt to the reservoir site was investigated but it was concluded that due to the steep contour of the land, installing a temporary access track for trucks would result in an excessive amount of disruption to the existing bush which would be unacceptable. Other adjoining streets were also considered, but were either narrower, steeper or sub-optimal compared to Rolleston Street in other ways.

As described further below, the staff entrance to site will be via Salisbury Terrace.

3.2.1 Regular Working Hours

A construction noise assessment is being undertaken and is expected to set the basis for allowable working hours on site. It is expected that working hours will be as per Wellington City Council policy. That is:

Monday to Friday	6:30am – 7:30 am	Quiet preparation work only
	7:30am – 6pm	Construction work with on road truck movements limited to off peak times only (9am to 3pm)*
	6pm – 8pm	Extra work required at a reduce noise level
Saturday	7:30am – 6pm	Construction work with on road truck movements not limited

* Some infrequent, specialised heavy vehicle movements, associated with the delivery and removal of specialised machinery and/or the delivery of pre-constructed components to the site, may be required to occur outside these hours (off-peak weekend periods and evenings as required).

3.2.2 Heavy Vehicle Movements

It is proposed that the majority of heavy vehicle movements to and from site along Rolleston Street will occur between 9am and 3pm. This approach is proposed so construction movements don't conflict with important commuter movements to work, school and university and minimise the disruption to parking. Movements after 3pm will be kept to a minimum in order to avoid inconvenience to residents.

The additional vehicle demand that the site will generate will vary throughout the construction programme. Different stages of the construction will also generate different heavy vehicle types.

a. Earthworks

It is proposed that heavy vehicles used for transporting surplus cut material from the site, and top soil to the site for landscape finishing, will be restricted to single unit rigid vehicles. These vehicles will have three or four axles and be approximately 8-9 metres in length.

There are three main stages in the programme that earthworks will be undertaken. During the initial excavation, reservoir construction and back fill phases. These will generate varying peak volumes of heavy vehicle movements to and from site.

For Option 1 (as described above) over the length of the construction programme, there is an estimated 6,500 heavy vehicle movements to and from site to complete the earthworks. The exact number of heavy vehicle flows during peak hours are not known at this stage.

For Option 2 (as described above) over the length of the construction programme, there is an estimated 2,150 heavy vehicle movements to and from site to complete the earthworks. It is assumed at this stage, that the peak daily flows will remain the same, but they will be over a much shorter period. This would simulate a worst case scenario in terms of greatest numbers of heavy vehicle movements. This methodology would be confirmed by the contractor prior to construction.

b. On Site Concrete

Concrete trucks are typically single unit rigid heavy vehicles. They will be of a similar size to the heavy vehicles used for the excavation phases.

Concrete will be poured on site during the reservoir construction phase of the programme. The number of concrete truck movements on any given day will be dependent on whether a pour is taking place on site or not. The days on which a pour is taking place it is expected that up to 6 heavy vehicle movements per hour could occur, though this will only be on a select number of days.

c. Pre-Cast Concrete and specialised machinery deliveries

Pre-cast concrete panels will be required to be delivered on a flatbed articulated truck. These vehicles will have larger swept paths and have been modelled below in Section 4.3. These vehicles will likely be six or seven axles in length and up to 20 metres long.

There will be up to 200 pre-cast elements that will be delivered to site over a three month period. It is proposed that these deliveries will take place throughout a normal operating day.

Some infrequent, specialised heavy vehicle movements (such as cranes and excavation machinery), associated with the delivery and removal of specialised machinery may be required to occur throughout the project. Specific consideration will be required for the delivery if the vehicle is outside of the NZ vehicle dimension standards.

The route heavy vehicle movements are proposed to take is described in Section 3.4 below.

3.2.3 Staff Vehicle Entrance

It is proposed that all staff will access the site from Salisbury Terrace via Wright Street, estimated at 40 vehicles each day. All vehicles will be accommodated within parking areas created on site. This will be for light vehicles only. No construction deliveries will be made to the Salisbury Terrace entrance.

Wright Street connects with Hargreaves Street to the north and Hutchison Road to the south. By connecting onto both of these roads, there are a wider range of options for staff arriving at and departing from site. This will spread the additional light vehicles that the construction site will generate wider over the network. Meaning that the network is more likely to accommodate the additional flows without disruption.

3.2.4 All Vehicle Movements

Average daily vehicle movements and peak heavy vehicle movements to and from site are shown in Figure 3-1 below. The average number of vehicles per day arriving to site includes staff vehicles that are accessing via Salisbury Terrace.

The average number of heavy vehicles arriving at site per hour is shown for both construction methodologies considered. It can be seen that by retaining the majority of the fill generated on site the overall number of heavy vehicle movements to and from site decreases. This is most notable in the construction phases that would have required fill to be taken from site or during the backfill phase.

Despite the lower number of heavy vehicle movements for Option 2, it is still considered possible that peak heavy vehicle flows could still occur to a level expected in Option 1. This is due to the possibility of a large amount of fill being trucked from site or a large concrete pour taking place over a short period of time. This means that when considering the effects of peak heavy vehicle flows to and from site, both options should be considered to have the same effect on the road network.

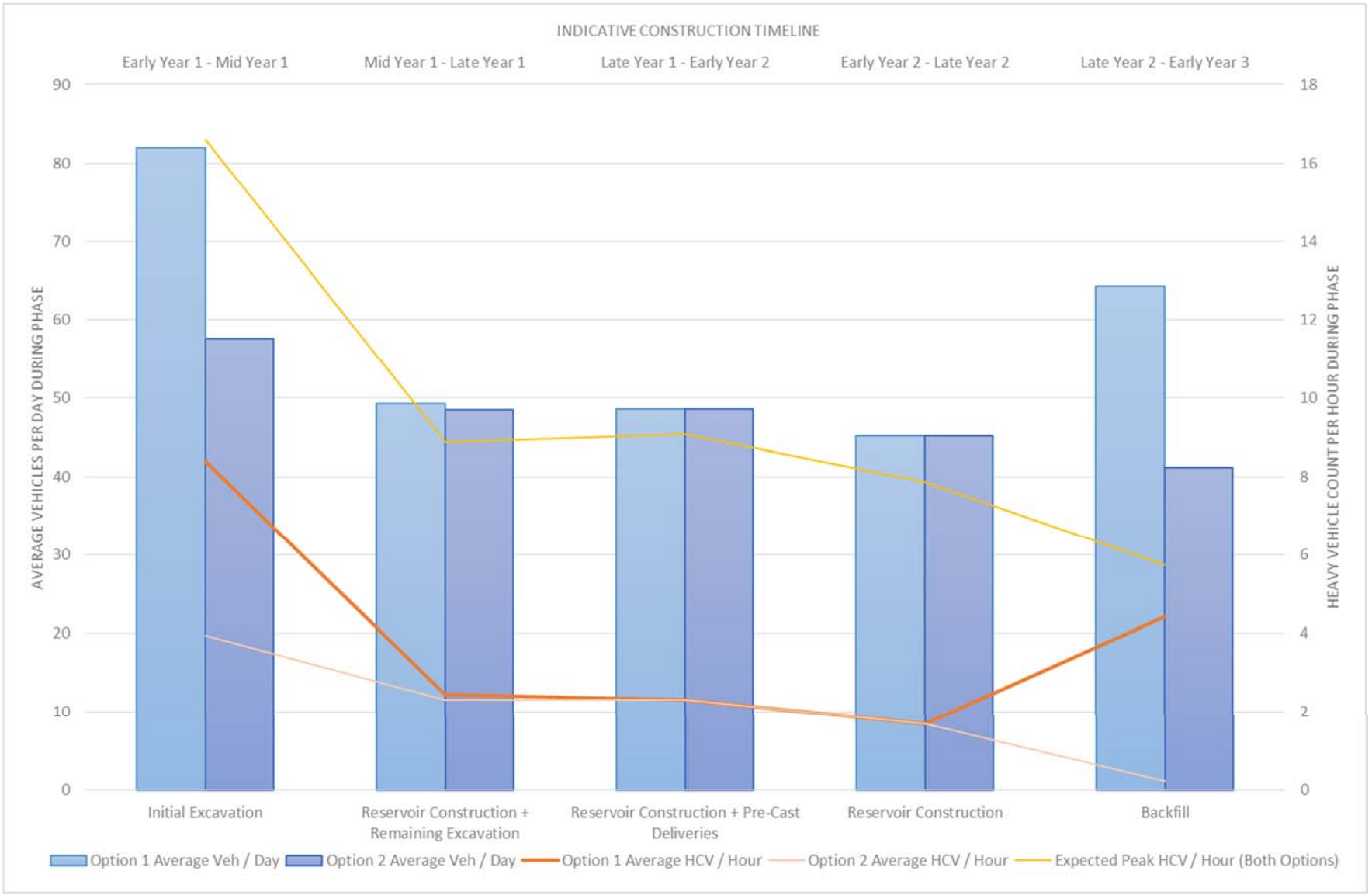


Figure 3-1: Number of vehicle movements during construction for each construction methodology

3.3 Rolleston Street

3.3.1 Wallace Street / Rolleston Street Intersection

It is proposed that the Wallace Street / Rolleston Street intersection remains as it is currently configured. No changes to the right turn bay or kerbs are proposed.

Temporary manual traffic control is proposed to be implemented in order to manage the movement of larger heavy vehicles into and out of Rolleston Street.

3.3.2 Temporary Speed Limit

It is proposed that a 30 kph speed restriction will be in place on Rolleston Street throughout the construction of the Reservoir.

This will not include the Wallace Street / Rolleston Street intersection.

3.3.3 Removed Parks

Some on street parking immediately adjacent to the intersection, at the curve, and at the end of Rolleston Street will need to be removed to allow for heavy vehicles to travel safely into, out of, and through Rolleston Street.

Figure 3-3 below shows the extent of removal of these car parking spaces. The final number of car parks to be removed is to be determined on site by WCC and the construction contractor. It is expected that 20-23 car parks will need to be removed. It is estimated that two of these car parks will be “Residents’ car parks with the balance being ‘Coupon’ car parks.

Maintaining the existing number of ‘Residents’ car parks is deemed to be of greater importance than ‘Coupon’ car parks. It is proposed that the existing number of ‘Residents’ car parks will be maintained throughout the construction period. There are no ‘Residents’ car parks at or above the bend on Rolleston Street. If the parking restrictions are extended beyond what is currently proposed, it is recommended that ‘Residents’ car parks be accommodated in the new car park area (detailed below). The number of ‘Residents’ car park below the bend will be maintained by changing ‘Coupon’ parks to ‘Residents’ parks.

It is proposed that a small, formed, temporary parking area will be created at the end of Rolleston Street as shown below in Figure 3-2 to accommodate a few resident cars, offsetting the removal of existing spaces. The number of car parks in this parking area is proposed to be a minimum of eight. This is the number required to meet demand for parking at the top of Rolleston Street during peak overnight residents parking periods.

The temporary car park on the upper field will be formed and maintained by the construction contractor. This area will be lit by temporary street lighting and will remain in place throughout the construction phase. Minor widening will take place at the top of Rolleston Street in order to be able to provide separate entrances for the proposed car park and construction site. The location of the car park and widening is shown in Figure 3-2. The details of this arrangement will need to be developed during the future stages of the project and consideration should be given to restricting the public from entering the site and reducing conflicts between public and construction vehicles.

Figure 3-2: Temporary car park at the Northern end of Rolleston Street

Figure 3-3: Proposed removal of on-street parking

3.4 Heavy Vehicle Route to and from Site

3.4.1 Proposed Route

Figure 3-4 outlines the proposed heavy vehicle (HV) route to and from the worksite and landfill via Happy Valley Road, and other deliveries, including precast concrete panels via SH1.

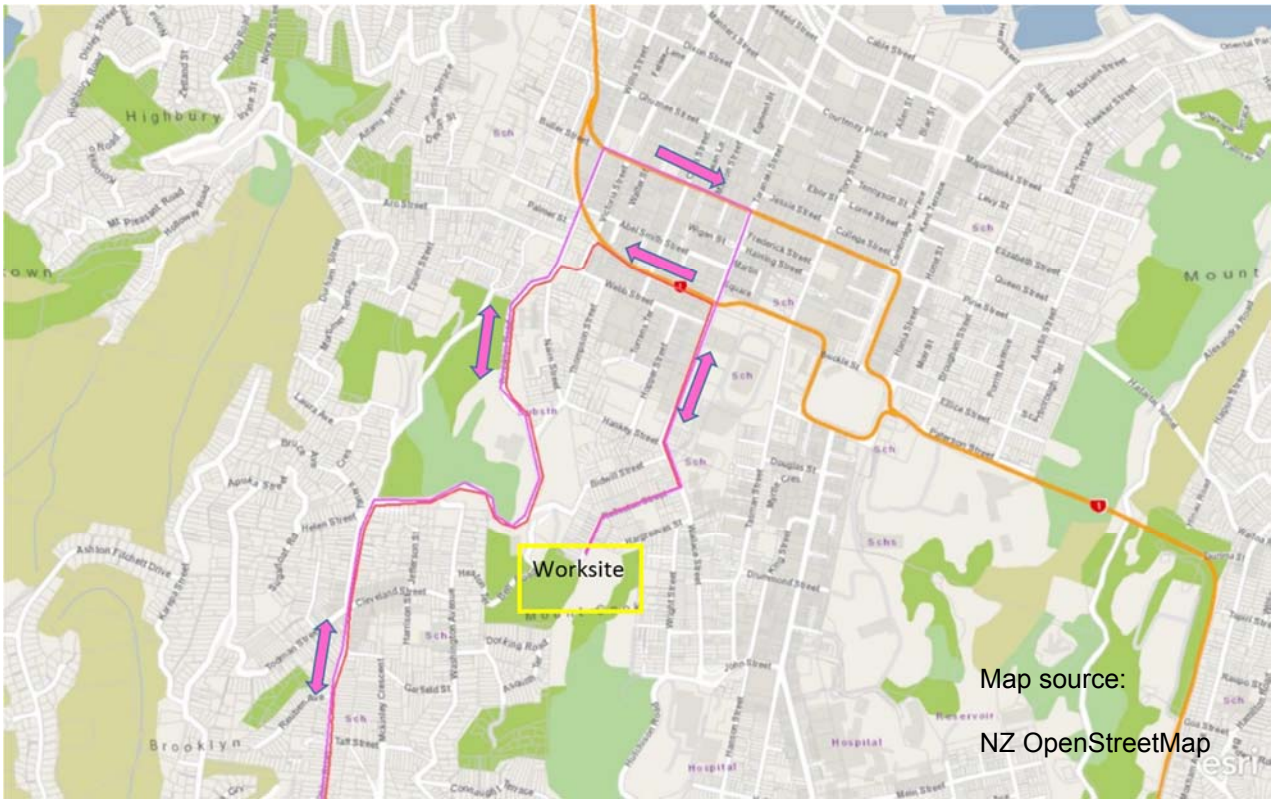


Figure 3-4: HCV Route from and to Landfill

The route from site to the landfill is:

- Rolleston Street
- Wallace Street
- Taranaki Street
- Arthur Street / State Highway 1
- Victoria Street
- Webb Street
- Willis Street
- Ohiro Road
- Happy Valley Road
- Landfill Road.

The return journey is the reverse except Willis Street is needed to be taken to Vivian Street / State Highway 1, before connecting onto Taranaki Street.

3.4.2 Considerations

Other routes to and from the worksite and landfill were considered but were deemed to be sub-optimal compared to the proposed route.

A route via Newtown would have provided a more direct trip to and from the work site and avoided SH1. This route would have passed through a greater number of residential streets, and would have posed challenges for heavy vehicles to manoeuvre around some corners. It would also have required heavy vehicles to make a right turn out of and left turn into Rolleston Street. The left turn movement would be more difficult, have required greater controls and resulted in greater delays at the Rolleston Street / Wallace Street intersection.

Other more direct connections to Brooklyn Road via Bidwill Street or Thomson and Nairn Streets are possible for vehicles. Heavy vehicles though are not permitted on these streets and therefore they are not suitable as part of a route for construction vehicles.

Webb Street could have been used by vehicle travelling from the worksite to the landfill. Given it runs immediately parallel to SH1, the route follows the higher classification of road. The route on SH1 provides gentler turns for the heavy vehicle movements and all turns are priority turns.

4 Appraisal of Transportation Effects

4.1 Rolleston Street

4.1.1 Traffic Effects

Rolleston Street will be used as the only point of access for heavy vehicles during construction of the reservoir. Heavy vehicles will be restricted to arrivals and departures outside of peak commute times.

During peak periods of construction traffic, the number of vehicles per hour on Rolleston Street may double or even triple. It is not anticipated that this will adversely affect the form or function of Rolleston Street. The numbers of vehicles overall will remain very low. Traffic flows will remain at a level expected for its One Network Road Classification (ONRC) as an 'Access Road' (<1,000 veh/day). Any additional delays experienced by residents using Rolleston Street are not expected to be significant.

Disruption to residents on Rolleston Street is being mitigated by heavy vehicle movements on Rolleston Street being restricted to outside of peak commute times. Staff vehicles will also access site from Salisbury Terrace rather than Wallace Street. These two mitigations will enable most residents to be able to undertake their normal daily routine without the worry of disruptions from construction vehicles on Rolleston Street.

The two construction methodologies will also have an impact on the amount of disruption to the residents on Rolleston Street. The option which retains a large amount of fill on site requires approximately a third of the number of heavy vehicle trips relating to the onsite excavation and backfilling than the alternative option. This will mean more than 4,000 fewer heavy vehicle return trips are made to and from site along Rolleston Street across the construction period.

Both options are considered to cause disruption to the residents of Rolleston Street that is more than minor. Of the two construction methodologies considered though Option 2, which retains a large amount of fill onsite, would cause the least disruption.

The impact on intersection delay for traffic as a result in this increase in traffic volumes is shown in Section 4.2.

4.1.2 Parking Effects

20-23 on-street parking spaces will be removed as outlined in Figure 3-3. These spaces will be removed to accommodate safe turning of the heavy vehicles into and out of the site. It is proposed that residents will be provided with an alternate parking space either at the end of the street (where a small, formed, temporary car park will be created) or several coupon parking spaces on the street will be converted into resident parking spaces.

Car parks lost at the top of Rolleston Street will be replaced within the new parking area created adjacent to the construction site on the Prince of Wales Park. This will add an additional walking distance for car park users of up to 140 metres. This distance is from the most distant displaced car park to the new car park. This additional walking distance is considered in line with an expected walking distance for residents.

The coupon parking lost at the bottom of Rolleston Street will not be replaced but rather demand for these parks will be met by capacity on surrounding nearby streets. It was clearly shown in the summary of the parking survey undertaken that there is sufficient parking capacity on the streets surrounding Rolleston Street (within 500 metres). There is approximately 60 'Coupon' car parks

available (30% of capacity) on the streets surveyed both at night and all-day parking. Therefore the loss of approximately six car parks near the intersection with Wallace Street will not have an adverse effect more than minor.

4.2 Wallace Street / Rolleston Street Intersection

4.2.1 Intersection Efficiency

The Rolleston Street / Wallace Street intersection has been modelled using SIDRA intersection – a software package used for intersection performance analysis – to predict the expected delay and queue length for the intersection. The traffic modelling compared the current scenario and the proposed construction scenario.

Based on the construction vehicle demand in Section 3.2, 17 HCV/hr are assumed to travel into and out of the construction site during the peak construction period.

The traffic modelling summarised below is for the 9am to 10am period because this construction period – outside of peak commuter periods which are being avoided – that has the highest existing traffic volume through the intersection. The assessment has been carried out based on a peak construction vehicle demand to create a worst case scenario.

Traffic volumes were based on traffic counts on Wallace Street (June 2016) and Rolleston Street (June 2010). Turning counts into and out of Rolleston Street were taken from the traffic survey undertaken on 9 and 10 March.

A comparison of the current intersection performance to the modelled intersection performance after the construction commences is detailed in **Table 4-1.** The delay is measured as the average vehicle delay (in seconds) on each approach, and the queue length is the 95th percentile queue in vehicles. Assumptions made for the modelling were:

- Heavy vehicles turning out of Rolleston Street is required to give way to vehicles turning right into Rolleston Street from Wallace Street
- Heavy vehicles will only turn right into Rolleston Street and left out of Rolleston Street
- There will be no change in route selection due to the Reservoir construction. The existing AADT will be maintained throughout the construction period
- Heavy vehicle movements will be co-ordinated to ensure that two trucks do not meet at the intersection at the same time. If this were to happen, there may be an instance where neither vehicle can proceed safely through the intersection. Radio contact when heavy vehicle movements to and from site are taking place will need to be maintained.

The full SIDRA outputs for the assessed intersection scenarios are included in **Appendix A.** Please note this model doesn't include the queuing from the Wallace Street/ Bidwell Street intersection. This is assessed later in the report.

Table 4-1: Wallace Street / Rolleston Street Intersection Traffic Modelling Results – 9-10AM

Approach	Peak Modelled Weekday Base		Peak Modelled Weekday with Construction Traffic	
	Average Delay (sec)	95% Queue length (veh)	Average Delay (sec)	95% Queue length (veh)
Northbound Wallace Street	0.0	0	0.0	0

Approach	Peak Modelled Weekday Base		Peak Modelled Weekday with Construction Traffic	
Eastbound Rolleston Street	18.8	0.2	16.1	0.3
Southbound Wallace Street	0.1	0.0	0.3	0.1
Total	0.4		0.6	

All approaches either maintain or see a slight reduction in the average delay. The overall average delay at the intersection increases marginally. This is due to there being more vehicles (additional construction traffic) turning left out of Rolleston Street onto Wallace Street. This movement experiences a lower average delay than the right turn out of Rolleston Street, which the majority of existing traffic makes.

Modelling delays incurred on Wallace Street in each direction are insignificant. The through movements do not have any additional delay. By maintaining the right turn bay on Wallace Street the additional turning vehicles do not obstruct the through vehicles. The additional delay on the southbound vehicles on Wallace Street is due to the greater number of vehicles right turning into Rolleston Street (this movement sees its modelled delay decrease). The modelled 95th percentile queue length on the right turn movement into Rolleston Street is less than one vehicle.

4.2.2 Heavy Vehicle Movements

Vehicle tracking at the Rolleston Street / Wallace Street intersection has been undertaken to check that the types of heavy vehicles expected during construction will be able to safely manoeuvre through the intersection.

Two types of vehicles will be predominantly used throughout construction. These are 8-9 metre rigid heavy vehicles and articulated heavy vehicles up to 19 metres. Other legal dimensioned vehicle types will be able to drive within the tested tracking curves. Vehicles that exceed NZ vehicle dimension or turning standards will need specific consideration for their movements to and from site.

Truck and trailer units for use during the excavation phase were also tested. They would require increased intervention by manual traffic controllers (stop/go) at the Rolleston Street / Wallace Street intersection. Manual traffic controller would be required on site – including a speed restriction to 30 km/h – for the duration of the construction that truck and trailer units are on site. The frequency of the delays to control the turning movements of these vehicles would have resulted in disruption to the road network that was considered more than minor. For this reason only single unit rigid heavy vehicles are proposed for use during the excavation phases.

a. Rigid Heavy Vehicles

The vehicle tracking for a nine metre rigid construction vehicle (dump truck) is shown in Figures 4-1 and 4-2 below. This tracking represents three- or four-axle heavy vehicles that will be used during the excavation phases of construction. It is also a suitable tracking curve for concrete trucks.

The vehicle tracking shows that for the right turn into Rolleston Street, from the right turn bay, the rigid heavy vehicle may cross the centre line of Rolleston Street. It will also require parking to be removed on Rolleston Street. Given the low number of vehicle movements out of Rolleston Street, this is proposed to be an accepted effect.

The left turn out of Rolleston Street will require the rigid heavy vehicle to cross into the right turn bay on Wallace Street. This will require heavy vehicles to give way to all vehicles in the right turn bay of Wallace Street. It is proposed that this is an accepted affect and that the vehicles making the left turn out of Rolleston Street movement will have to give way to vehicles in the right turn bay (i.e. they will wait and let the vehicle(s) in the right turn bay turn right out of Wallace Street, before themselves attempting to turn left into Wallace Street). This will not inconvenience driver turning into Wallace Street therefore the effects to the public are considered minor.

Heavy vehicle movements will be co-ordinated to ensure that two trucks do not meet at the intersection at the same time. If this were to happen, there may be an instance where neither vehicle can proceed safely through the intersection. Radio contact when heavy vehicle movements to and from site are taking place will need to be maintained.

Changes to the intersection configuration were considered to provide space for rigid heavy vehicles to make the left turn out of Rolleston Street unopposed. This would have resulted in the right turn bay on Wallace Street being remove. Intersection modelling showed that the overall intersection delay would be less if the right turn bay was maintained.

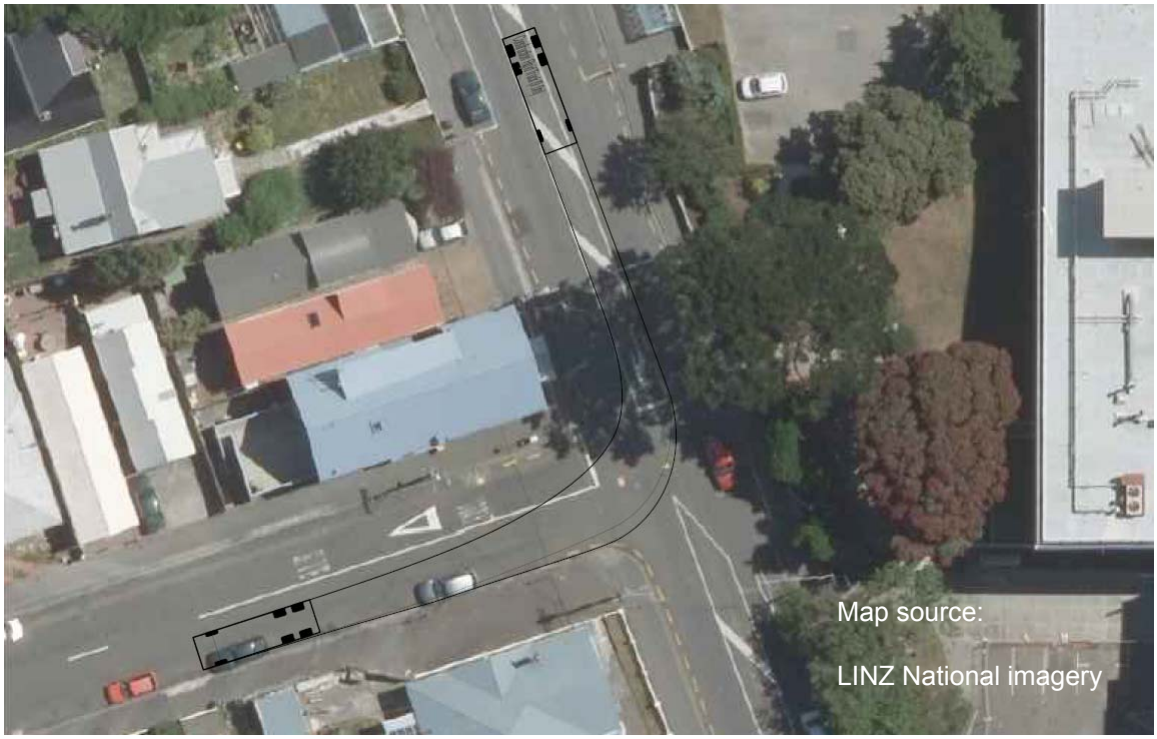


Figure 4-1: Rigid construction vehicle tracking curve. Right turn into Rolleston Street

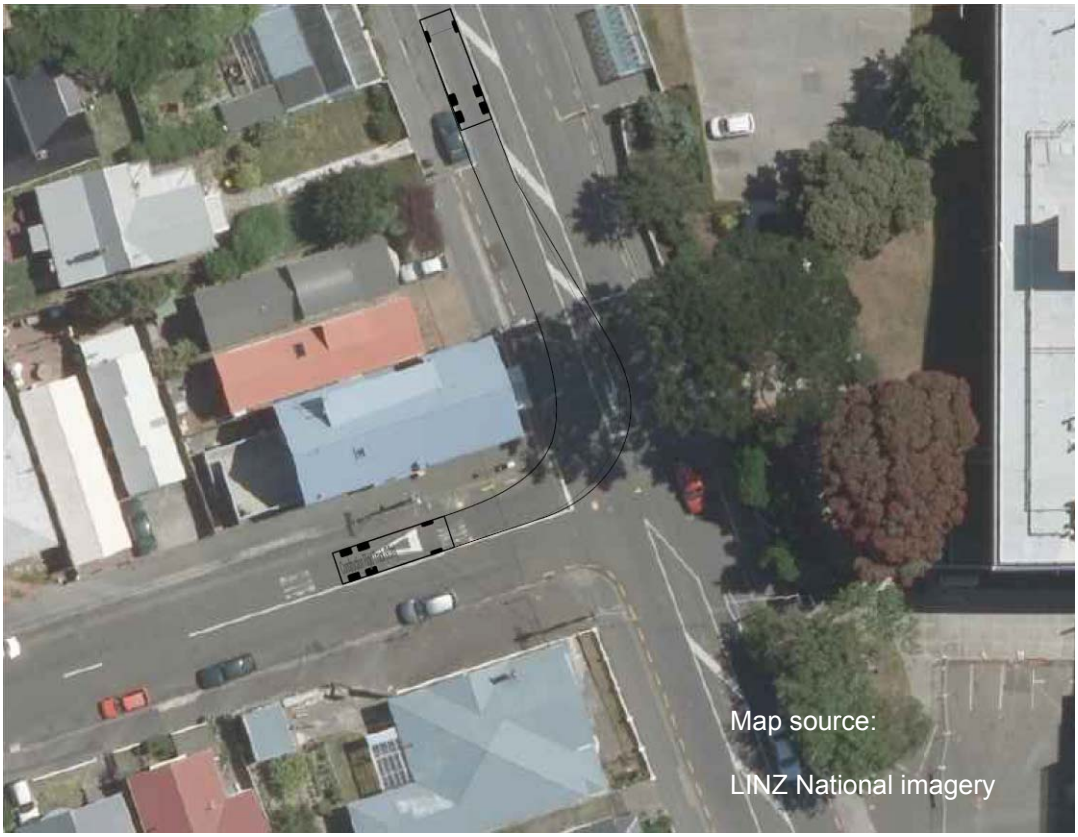


Figure 4-2: Rigid construction vehicle tracking curve. Left turn out of Rolleston Street

b. Articulated Vehicles

The vehicle tracking for a 19 metre articulated heavy vehicle is shown in Figures 4-3 and 4-4 below. This tracking represents a seven axle heavy vehicle that will be used for pre-cast concrete deliveries for the reservoir. It is the worst case tracking curve as set out by the NZ Transport Agency's Road Traffic Standard 18 (RTS 18) so all legal vehicles should be able to follow within this tracking curve (excluding vehicles that exceed NZ dimension rules). It would be representative for specialised deliveries so long as the heavy vehicle meets the NZ dimension and turning standards.

For both the right turn in and left turn out of Rolleston Street the articulated vehicles will require the intersection to be closed to other vehicles. It is proposed that vehicles will be stopped by manual traffic controllers (Stop/Go) for a short duration in all three directions for the articulated vehicle to turn into or out of Rolleston Street. These deliveries would likely take place during off-peak times on weekdays and Saturdays.

It is expected that this manoeuvre would be undertaken in less than 10 seconds and may result in delays on Wallace Street of up to 30 seconds given the time to stop traffic in all directions. During the off-peak times, when these movements will take place, and under normal flow conditions, this is expected to result in a queue of up to 9 vehicles in each direction. The traffic signals to the north and pedestrian crossing to the south may result in vehicles platooning from these locations, and increase the queue length. There may be some minor flow on effects if the queue length were to extend to the Wallace Street / Bidwill Street traffic signals. As the traffic is to be controlled manually, specific flows could be controlled and released more quickly if that is required. The effects of stopping vehicles at the intersection are expected to dissipate quickly as movements will be in non-peak periods, and only

for a very short duration. These movements are only expected to occur infrequently (approximately 4 movements per day on during peak pre-cast delivery periods).

Figure 4-3: Articulated vehicle tracking curve. Right turn into Rolleston Street

Figure 4-4: Articulated vehicle tracking curve. Left turn out of Rolleston Street

c. Specialised Deliveries

It may be necessary for some deliveries made to site to be on HVs that exceed NZ dimension rules. These may be for specialised machinery or large pre-cast concrete components. If these are required then specific evidence that these vehicles can turn into, out of and travel along Rolleston Street will be required. Agreement with WCC will be required and over-dimension rules will need to be complied with.

4.3 Wider Network Effects

4.3.1 Bidwill Street / Wallace Street Intersection

The Bidwill Street / Wallace Street intersection is 100m north of Rolleston Street. The additional HVs and staff vehicles may impact on the operation of this intersection as well. SIDRA was used to predict the expected level of service, delay and queue length for the intersection comparing the current scenario with the proposed construction scenario.

It is assumed that 17 HVs will travel to and from the construction site in the peak period on Wallace Street. It is also assumed that all staff drive to site individually. All these movements have been assumed to pass through the Bidwill Street / Wallace Street intersection as opposed to taking other routes to site – as a worst case scenario. Therefore, 40 staff vehicles/hr will be added for intersection modelling to Wallace Street during peak construction flow periods.

A comparison of the current intersection performance to the proposed intersection performance after the construction commences is detailed in Table 2. The delay is measured as the average vehicle

delay (in seconds) on each approach, and queue is the 95th percentile queue in number of vehicles. The full SIDRA outputs for the assessed intersection scenarios are included in **Appendix A.**

Table 2: Bidwill Street / Wallace Street Intersection

Approach	Peak Modelled Weekday Base		Peak Modelled Weekday with Construction Traffic	
	Average Delay (sec)	95% Queue length (veh)	Average Delay (sec)	95% Queue length (veh)
Northbound Wallace Street	9.8	22	10.0	24
Eastbound Bidwill Street	49.0	5	49.0	5
Southbound Wallace Street	7.2	13	7.3	13
Westbound Massey Uni	45.6	8	45.6	8
Total	14.6		14.6	

The modelling shows that the addition of construction traffic will have little effect on delays and queuing at the Wallace Street / Bidwill Street intersection. There is no modelled increase in the overall delay at the intersection. Peak periods in construction site arrivals / departures may generate some short additional delays, but these would not be outside of the normal fluctuations currently experienced at the intersection.

Based on the modelled results above, there is little to no effect at Bidwill Street / Wallace Street intersection as a result of the construction. It is therefore considered that the proposed development would have no significant adverse effects on the operation of Wallace Street or Bidwill Street.

4.3.2 Salisbury Terrace Site Entrance

Staff will access the site off Salisbury Terrace and Wright Street which will distribute the additional traffic demand across the network. There will be various routes utilised by these vehicles to and from site that will reduce the effects the additional demand will have.

Salisbury Terrace and Wright Street are approximately 9 metres wide for its entire length with parking on both sides. The additional staff vehicles would be in line with the number of vehicles currently using these road. It is not anticipated that there will be any adverse effects from these vehicles accessing site.

4.3.3 Wider Network Heavy Vehicle Effects

Adverse effects of the additional heavy vehicle movements beyond Rolleston Street and the Rolleston Street / Wallace Street intersection are expected to be less than minor.

The proposed heavy vehicle route will utilise roads which have a high classification in the Wellington road network hierarchy and where the impact on those roads will be in line with their current use. By doing so the effects will not be as distinguishable by the public. These roads will be designed to carry these types of heavy vehicles.

The heavy vehicle movements will be restricted to outside of peak times so they will not have a detrimental effect on the times when the greatest delays are being incurred on the network.

4.4 Active Modes

Safe and convenient access for pedestrians, cyclists and other active road users will be maintained throughout the construction period. For the safety of the public and physical works contractor, some public pathways will be closed – Appendix C.

4.4.1 Pedestrians

All footpaths and crossings will be maintained throughout construction with the one exception of immediately outside the construction site entrance.

The effects on pedestrians making trips on the roads will be less than minor. There will be an increase in the overall number of vehicles on Rolleston Street, though this is not expected to result in any additional delays to pedestrians.

A temporary speed restriction of 30 kph is proposed on Rolleston Street for construction traffic where there will be the greatest number of heavy vehicle movements. The lower speed will mean that vehicles will be travelling at a safer speed giving drivers more time to react to pedestrians crossing the road.

4.4.2 Cyclists

There are no changes proposed to the road layout or use of space. On Rolleston Street, the removal of some car parks will provide more space for cyclists alongside traffic lanes. This means that the space currently utilised by cyclists will remain the same or even increase during the construction period. Impacts on cyclists will be less than minor. The temporary speed limit on Rolleston Street will also reduce the potential speed differential between cyclists and construction vehicles, allowing safer interaction.

Cycle tracks within the park will be affected by the construction works. Appropriate advertising, including signage within the park will be used to inform cyclists of alternative cycle routes to get onto Wallace Street. This will be developed closer to the start of works as a part of the Construction Traffic Management Plan (CTMP).

4.4.3 Pathways Through Town Belt

A number of pathways through the town belt will be closed as they will be within, or pass through the reservoir construction site. There are suitable alternative routes for all of the pathways through the closed section of the town belt. Some trips may take slightly longer than previously. It is proposed that this is mitigated by good communication with the public of the changes and providing clear detour routes.

The effects on active users within the town belt is being considered further in other assessment reports. **Appendix C** shows effected commuter pedestrian routes and potential detour routes.

4.5 Road Safety

Two crash trends were identified on Rolleston Street and at the Wallace Street / Rolleston Street intersection. On Rolleston Street there were a large proportion of collisions with parked vehicles. Considering other mitigation measures that will be in place – removal of car parking and the temporary speed reduction – it is not expected that road safety on Rolleston Street will be adversely affected. The additional traffic generated on Rolleston Street is not expected adversely affect this crash trend.

At the Wallace Street / Rolleston Street intersection, the crash type has predominantly been rear end. This has occurred on the Wallace Street as a result of vehicles stopping at either the traffic signals at Bidwill Street or the pedestrian crossing. Mitigations that will be in place during these deliveries – as set out in the CTMP – will ensure that this crash trend is not exacerbated further during the construction periods where heavy articulated vehicles are making deliveries to site and traffic on Wallace Street is being stopped. The aim to avoid any unexpected stops for the main traffic flow and reduce the chance of more rear end type crashes.

Mitigation measure for the Wallace Street / Rolleston Street are discussed further in the CTMP. They include:

- Pre-Construction communication with road users to ensure prior knowledge of the construction
- “Trucks Crossing” signs erected on each approach to the Wallace Street / Rolleston Street intersection
- Additional signage on days when traffic will be stopped at the Wallace Street / Rolleston Street intersection
- No heavy vehicles movements will take place during peak periods.

The additional construction traffic will be in context with the current operation of the wider road network. On Wallace Street for example, the additional 80 construction vehicles / day would represent an increase in daily traffic of 0.4%. It is considered that with the above mitigation the proposed Reservoir construction would have a minor adverse effect on road safety on Rolleston Street and at the Wallace Street / Rolleston Street intersection, and a less than minor effect on the surrounding road network.

4.6 Pavement and Surfacing

Pavement and seal maintenance may be required given the additional heavy vehicle loading that the construction will generate. The steep grade of Rolleston Street and tight turning circles at the Rolleston Street / Wallace Street intersection will potentially accelerate damage caused by vehicles.

It is proposed that the physical works contractor will monitor and repair seal and pavement defects arising from the construction traffic on Rolleston Street and the Rolleston Street / Wallace Street intersection throughout the duration of the contract. This could include but is not limited to road surface and potholes repairs.

Reconstructing a pavement before or while it is heavily trafficked by heavy vehicles under significant breaking and acceleration is less than ideal. Therefore, if any major pavement rehabilitation is required, this will take place upon completion of the phases of work that require significant movements of heavy vehicles. By deferring the pavement construction, it will allow a more robust pavement to be constructed.

Condition surveys of the surfacing and pavement will be undertaken prior to construction, during construction and post construction. Any issues identified will be remediated within a short timeframe or deferred as described above.

4.7 Construction Traffic Management Plan (CTMP)

A Construction Traffic Management Plan (CTMP) will be developed for this project which further details mitigation measures and traffic management process for the construction phase. The CTMP will be updated by the contractors and agreed with Council prior to initiating work on the Reservoir. The CMP will set out the general method and process for managing the traffic effects during construction. Specifically, the CTMP should aim to route heavy vehicles via the arterial road network and avoid sensitive land uses, ensure that sufficient contractor car parking is provided on the site and

coordinate deliveries / loading to occur outside of peak hours, when practical, among the other mitigation measures identified in this document. A draft CTMP is provided as a separate document in **Appendix F**.

5 Conclusions & Recommendations

The assessment above has shown that the effects of the construction of the Prince of Wales/Omāroro Reservoir on the transport network are varied and wide ranging.

The effects on the transport network are considered to be minor for either of the construction methodology scenarios that have been considered. A number of mitigation measures are recommended to ensure the transport network continues to function effectively during construction. The recommended mitigation measures include:

- Use of Rolleston Street as the primary heavy vehicle access for the construction site. This is the most appropriate adjoining road for heavy vehicle access
- Restrict heavy vehicle access to and from the site to outside of peak commute hours
- Restrict the size of heavy vehicles that are able to remove excavated materials from the site during excavation periods. By doing so the need for manual traffic control and the Wallace Street / Rolleston Street intersection will be greatly reduced
- Some larger heavy vehicles will be required for pre-cast concrete deliveries. Some larger vehicles may also be required to deliver and remove specialised machinery from the site. Short manual stops of traffic at the Rolleston Street / Wallace Street intersection will be required to enable the larger vehicles to enter / exit. These will be timed for off peak periods
- Use of Salisbury Terrace as the access to and from site for light vehicles and staff. By splitting this entrance from the heavy vehicle entrance any adverse effects of the additional construction traffic will be spread wider over the network. This will result in a lower overall impact on the network
- Temporarily remove car parks from specified areas along Rolleston Street to allow for heavy vehicles to safely manoeuvre into and out of the Rolleston Street / Wallace Street intersection and along Rolleston Street
- Provide a small, formed, temporary car park area for displaced on-street car parks. This will be located off Rolleston Street on the existing upper Prince of Wales sport field, adjacent to the construction site
- Introduce a temporary speed restriction of 30 kph on Rolleston Street throughout the construction period
- A specific heavy vehicle route to and from site has been recommended. This route utilises the major roads on the network to limit the effects of heavy vehicle movements to roads which serve for this purpose and currently experience these effects
- The development and approval of a Construction Traffic Management Plan (CTMP) which further details these mitigation measures and traffic management process for the construction phase.

The on-street parking survey undertaken has shown that there is sufficient capacity on the surrounding streets to meet the demand for day-time parking of workers and students. ‘Residents’ car parking on Rolleston Street can be maintained through a combination of the new car park on the upper sports field or by converting ‘Coupon’ car parks. Overall, there will be a minor impact on parking for local residents and a less than minor impact for the wider community.

The heavy vehicle movements to and from site have been modelled and shown to cause limited effect on the transport network. Heavy vehicles are able to turn into and out of Rolleston Street with only minor changes to car parks on Rolleston Street. Traffic volumes on Rolleston Street are low and heavy vehicle movements to and from site are proposed to be restricted to outside of peak commute times. The effect these heavy vehicles have on the safe and efficient operation of the Wallace Street / Rolleston Street intersection is expected to be minor.

A route to and from site for construction traffic has been identified and is appropriate for the types of vehicles that will use it. Other routes that were considered would have a greater effect on the function of the transport network.

A temporary speed limit on Rolleston Street will give all road users more time to react should a collision be imminent. It will mean that speeds travelled will be more forgiving. There will not be any pedestrian or cycle facilities removed from on the street. They will be able to continue to use the road in the same was as they did previously.

Pavement and seal maintenance will be undertaken by the physical works contractor throughout the construction period. This will occur to ensure Rolleston Street remains safe, efficient and fit for purpose during the construction period.

Modelling has shown that the effect on the traffic flows at the Wallace Street / Rolleston Street and Wallace Street / Bidwill Street intersections is less than minor. Outside of the immediate area, the effects of the construction traffic will likely not be noticed.

Given the implementation of the mitigation measures above, the construction of the Prince of Wales/Omāroro Reservoir is considered to have a less than minor impact on the transport network.

Appendix A

Traffic Flows

Rolleston Street Existing Hourly Traffic Flow – June 2010

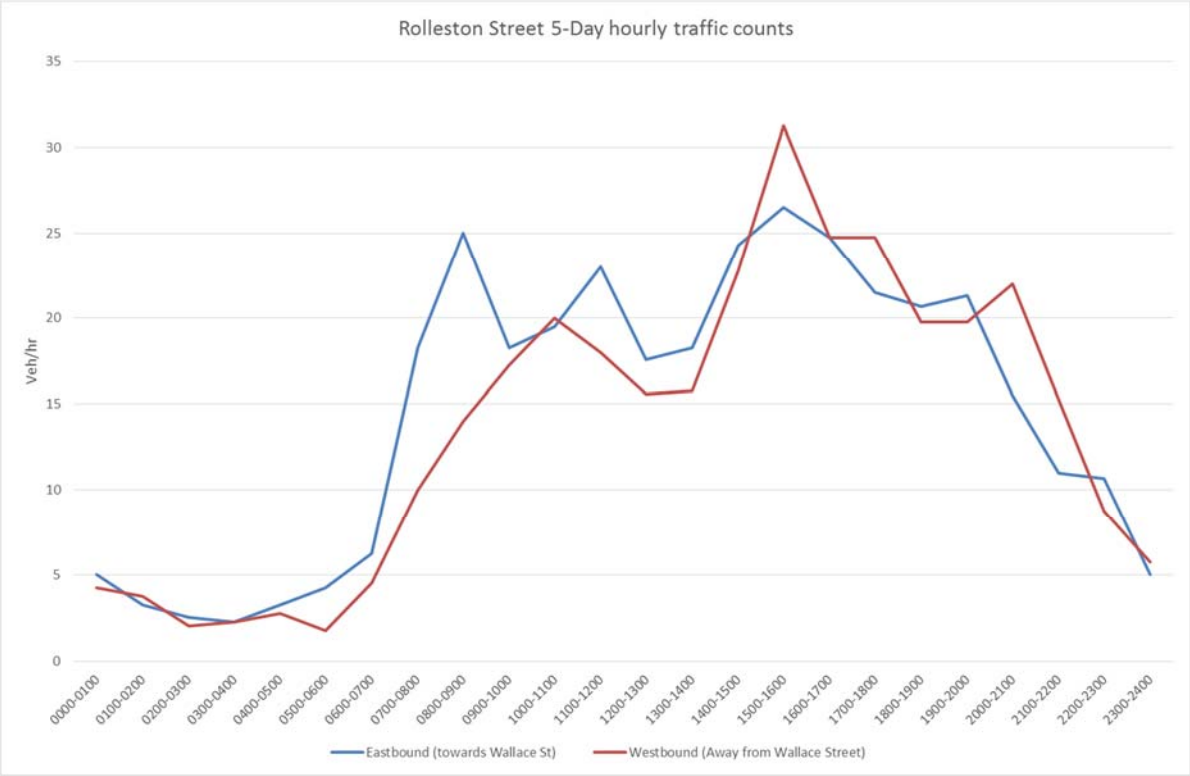


Figure 5-1 : Rolleston Street Hourly Traffic – Tube Counts

Wallace Street Existing Hourly Traffic Flow – June 2016

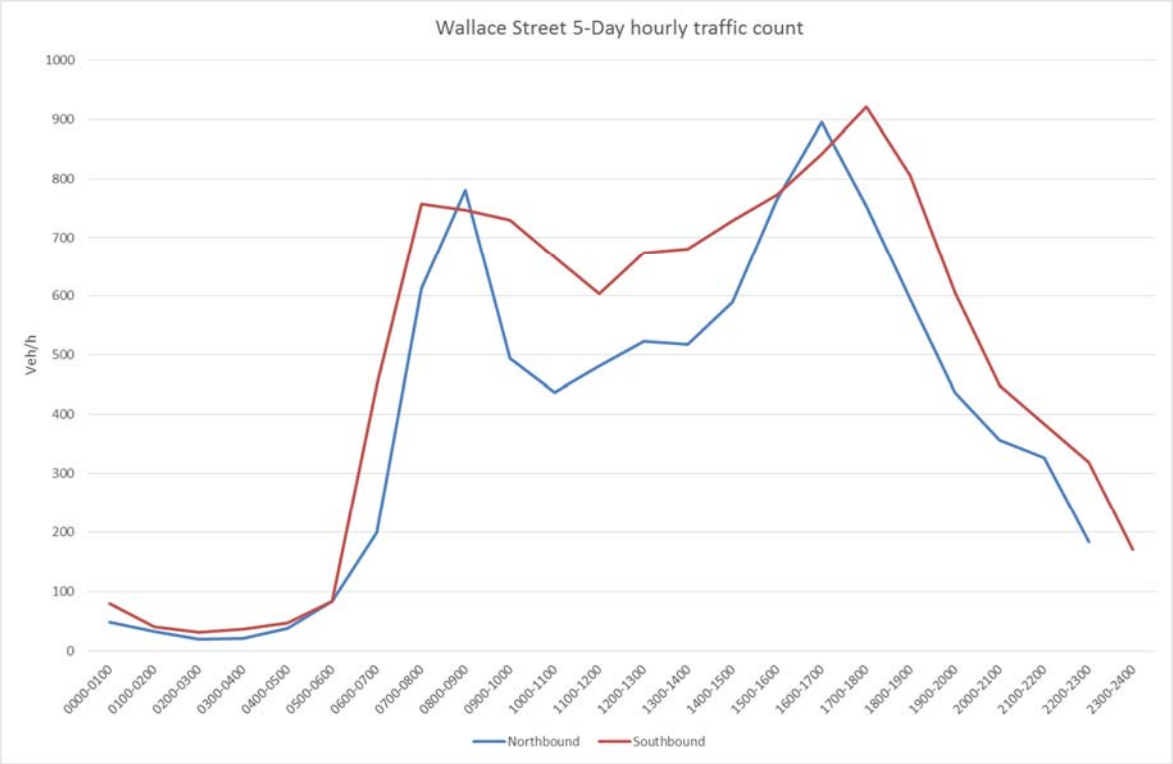


Figure 5-2: Wallace Street Hourly Traffic – Tube Counts

Figure 5-2 illustrates that Wallace Street experiences peaks during the morning and afternoon commute periods. The flows though do not appear tidal, with vehicle numbers in each direction peaking during each period. The peak flow in each direction occurs during the PM peak commute period 4pm-6pm.

Appendix B

Sidra Intersection Modelling Results

MOVEMENT SUMMARY

▽ Site: Wallace Rolleston Base 9-10 AM - Base

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wallace Street											
1	L2	2	0.0	0.251	5.5	LOS A	0.0	0.0	0.00	0.00	56.1
2	T1	474	4.7	0.251	0.0	LOS A	0.0	0.0	0.00	0.00	59.8
Approach		476	4.6	0.251	0.0	NA	0.0	0.0	0.00	0.00	59.8
North: Wallace Street											
8	T1	798	5.7	0.424	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
9	R2	13	0.0	0.011	7.2	LOS A	0.0	0.3	0.48	0.62	43.5
Approach		811	5.6	0.424	0.1	NA	0.0	0.3	0.01	0.01	59.2
West: Rolleston Street											
10	L2	8	0.0	0.008	7.3	LOS A	0.0	0.2	0.46	0.61	42.9
12	R2	11	0.0	0.068	28.0	LOS D	0.2	1.5	0.88	0.95	26.9
Approach		19	0.0	0.068	18.8	LOS C	0.2	1.5	0.69	0.80	32.3
All Vehicles		1305	5.2	0.424	0.4	NA	0.2	1.5	0.01	0.02	58.0

MOVEMENT SUMMARY

▽ Site: Wallace Rolleston Base 9-10 AM - Base + HCVs

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wallace Street											
1	L2	2	0.0	0.251	5.5	LOS A	0.0	0.0	0.00	0.00	56.1
2	T1	474	4.7	0.251	0.0	LOS A	0.0	0.0	0.00	0.00	59.8
Approach		476	4.6	0.251	0.0	NA	0.0	0.0	0.00	0.00	59.8
North: Wallace Street											
8	T1	798	5.7	0.424	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
9	R2	27	53.8	0.036	8.7	LOS A	0.1	1.5	0.55	0.69	38.3
Approach		825	7.3	0.424	0.3	NA	0.1	1.5	0.02	0.02	57.8
West: Rolleston Street											
10	L2	23	63.6	0.106	9.8	LOS A	0.3	3.4	0.68	0.84	33.2
12	R2	11	0.0	0.106	29.8	LOS D	0.3	3.4	0.68	0.84	34.7
Approach		34	43.8	0.106	16.1	LOS C	0.3	3.4	0.68	0.84	33.6
All Vehicles		1335	7.3	0.424	0.6	NA	0.3	3.4	0.03	0.04	56.4

MOVEMENT SUMMARY

Site: Wallace Rolleston Base 3-4 PM - Base

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wallace Street											
1	L2	9	0.0	0.383	5.5	LOS A	0.0	0.0	0.00	0.01	56.0
2	T1	715	4.9	0.383	0.0	LOS A	0.0	0.0	0.00	0.01	59.5
Approach		724	4.8	0.383	0.1	NA	0.0	0.0	0.00	0.01	59.4
North: Wallace Street											
8	T1	759	3.7	0.399	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
9	R2	17	6.3	0.023	9.3	LOS A	0.1	0.7	0.60	0.74	40.7
Approach		776	3.8	0.399	0.2	NA	0.1	0.7	0.01	0.02	58.7
West: Rolleston Street											
10	L2	5	0.0	0.007	8.9	LOS A	0.0	0.2	0.56	0.67	41.2
12	R2	17	0.0	0.155	38.5	LOS E	0.5	3.2	0.92	0.97	22.7
Approach		22	0.0	0.155	31.4	LOS D	0.5	3.2	0.84	0.90	25.4
All Vehicles		1522	4.2	0.399	0.6	NA	0.5	3.2	0.02	0.02	56.9

MOVEMENT SUMMARY

Site: Wallace Rolleston Base 3-4 PM - Base + HCVs

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wallace Street											
1	L2	9	0.0	0.383	5.5	LOS A	0.0	0.0	0.00	0.01	56.0
2	T1	715	4.9	0.383	0.0	LOS A	0.0	0.0	0.00	0.01	59.5
Approach		724	4.8	0.383	0.1	NA	0.0	0.0	0.00	0.01	59.4
North: Wallace Street											
8	T1	759	3.7	0.399	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
9	R2	31	48.3	0.062	11.9	LOS B	0.2	2.3	0.67	0.85	35.7
Approach		789	5.5	0.399	0.5	NA	0.2	2.3	0.03	0.03	57.0
West: Rolleston Street											
10	L2	20	73.7	0.212	15.8	LOS C	0.7	6.4	0.86	0.96	26.3
12	R2	17	0.0	0.212	41.5	LOS E	0.7	6.4	0.86	0.96	27.4
Approach		37	40.0	0.212	27.6	LOS D	0.7	6.4	0.86	0.96	26.8
All Vehicles		1551	6.0	0.399	0.9	NA	0.7	6.4	0.03	0.04	55.1

Bidwill Street/ Wallace Street intersection AM Peak: Base Scenario

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wallace Street											
1	L2	78	1.0	0.715	18.8	LOS B	16.3	118.8	0.77	0.72	44.0
2	T1	700	5.0	0.715	9.7	LOS A	16.3	118.8	0.77	0.72	44.0
3	R2	20	0.0	0.152	40.2	LOS D	0.6	4.2	0.98	0.68	28.3
Approach		798	4.5	0.715	11.3	LOS B	16.3	118.8	0.77	0.72	43.4
East: Massey Uni											
4	L2	25	0.0	0.245	30.0	LOS C	2.1	15.0	0.87	0.74	33.7
5	T1	30	0.0	0.245	21.8	LOS C	2.1	15.0	0.87	0.74	33.7
6	R2	30	0.0	0.245	30.1	LOS C	2.1	15.0	0.87	0.74	33.7
Approach		85	0.0	0.245	27.2	LOS C	2.1	15.0	0.87	0.74	33.7
North: Wallace Street											
7	L2	67	0.0	0.605	16.4	LOS B	12.0	87.3	0.67	0.63	45.9
8	T1	589	5.0	0.605	8.1	LOS A	12.0	87.3	0.67	0.63	45.9
9	R2	20	0.0	0.080	25.5	LOS C	0.4	3.1	0.74	0.73	35.1
Approach		676	4.4	0.605	9.4	LOS A	12.0	87.3	0.67	0.64	45.5
West: Bidwill street											
10	L2	50	1.0	0.380	31.8	LOS C	3.5	24.7	0.90	0.78	33.2
11	T1	34	0.0	0.380	22.6	LOS C	3.5	24.7	0.90	0.78	33.2
12	R2	50	1.0	0.380	32.0	LOS C	3.5	24.7	0.90	0.78	33.2
Approach		134	0.7	0.380	29.6	LOS C	3.5	24.7	0.90	0.78	33.2
All Vehicles		1693	3.9	0.715	12.8	LOS B	16.3	118.8	0.75	0.69	42.6

Bidwill Street/ Wallace Street intersection AM peak: With ongoing construction

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wallace Street											
1	L2	78	1.0	0.715	18.8	LOS B	16.3	118.8	0.77	0.72	44.0
2	T1	700	5.0	0.715	9.7	LOS A	16.3	118.8	0.77	0.72	44.0
3	R2	20	0.0	0.152	40.2	LOS D	0.6	4.2	0.98	0.68	28.3
Approach		798	4.5	0.715	11.3	LOS B	16.3	118.8	0.77	0.72	43.4
East: Massey Uni											
4	L2	25	0.0	0.245	30.0	LOS C	2.1	15.0	0.87	0.74	33.7
5	T1	30	0.0	0.245	21.8	LOS C	2.1	15.0	0.87	0.74	33.7
6	R2	30	0.0	0.245	30.1	LOS C	2.1	15.0	0.87	0.74	33.7
Approach		85	0.0	0.245	27.2	LOS C	2.1	15.0	0.87	0.74	33.7
North: Wallace Street											
7	L2	67	0.0	0.641	16.7	LOS B	13.1	95.3	0.69	0.65	45.6
8	T1	626	5.0	0.641	8.3	LOS A	13.1	95.3	0.69	0.65	45.6
9	R2	20	0.0	0.080	25.5	LOS C	0.4	3.1	0.74	0.73	35.1
Approach		713	4.4	0.641	9.6	LOS A	13.1	95.3	0.69	0.65	45.2
West: Bidwill street											
10	L2	50	1.0	0.380	31.8	LOS C	3.5	24.7	0.90	0.78	33.2
11	T1	34	0.0	0.380	22.6	LOS C	3.5	24.7	0.90	0.78	33.2
12	R2	50	1.0	0.380	32.0	LOS C	3.5	24.7	0.90	0.78	33.2
Approach		134	0.7	0.380	29.6	LOS C	3.5	24.7	0.90	0.78	33.2
All Vehicles		1730	3.9	0.715	12.8	LOS B	16.3	118.8	0.75	0.70	42.5

Bidwill Street/ Wallace Street intersection PM Peak: Base Scenario

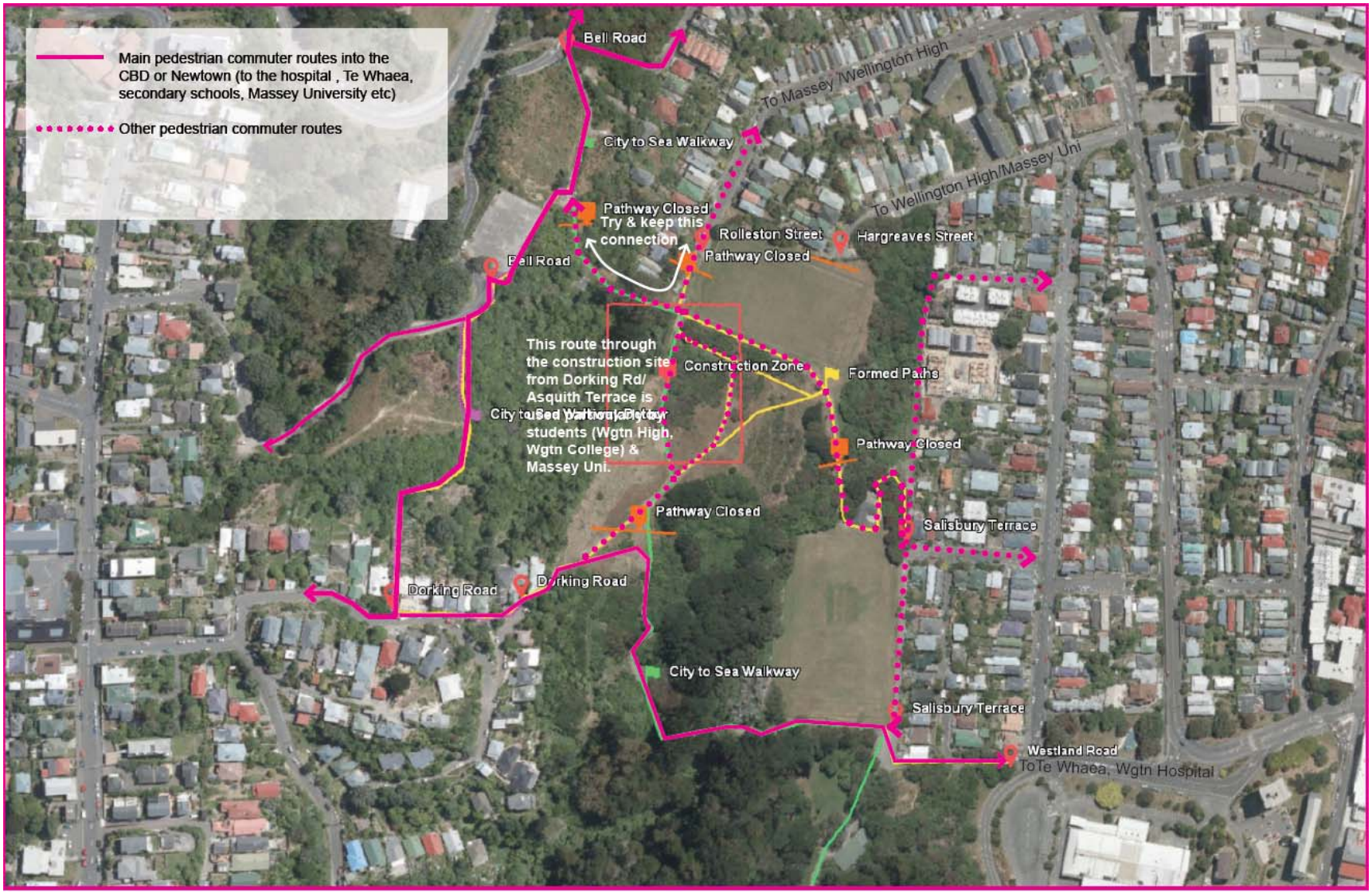
Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wallace Street											
1	L2	95	0.0	0.683	15.9	LOS B	22.4	156.7	0.60	0.60	46.6
2	T1	835	0.0	0.683	7.7	LOS A	22.4	156.7	0.60	0.60	46.6
3	R2	25	0.0	0.284	58.1	LOS E	1.2	8.1	1.00	0.69	23.0
Approach		955	0.0	0.683	9.8	LOS A	22.4	156.7	0.61	0.60	45.4
East: Massey Uni											
4	L2	40	0.0	0.541	48.5	LOS D	5.3	37.4	0.97	0.79	26.1
5	T1	45	0.0	0.541	40.3	LOS D	5.3	37.4	0.97	0.79	26.1
6	R2	40	0.0	0.541	48.6	LOS D	5.3	37.4	0.97	0.79	26.1
Approach		125	0.0	0.541	45.6	LOS D	5.3	37.4	0.97	0.79	26.1
North: Wallace Street											
7	L2	69	0.0	0.512	13.3	LOS B	12.5	87.5	0.46	0.47	49.3
8	T1	605	0.0	0.512	5.7	LOS A	12.5	87.5	0.46	0.47	49.3
9	R2	29	0.0	0.120	24.3	LOS C	0.8	5.3	0.60	0.75	35.9
Approach		703	0.0	0.512	7.2	LOS A	12.5	87.5	0.47	0.48	48.5
West: Bidwill street											
10	L2	60	0.0	0.714	51.3	LOS D	7.7	54.0	1.00	0.88	25.2
11	T1	50	0.0	0.714	43.1	LOS D	7.7	54.0	1.00	0.88	25.2
12	R2	60	0.0	0.714	51.4	LOS D	7.7	54.0	1.00	0.88	25.2
Approach		170	0.0	0.714	49.0	LOS D	7.7	54.0	1.00	0.88	25.2
All Vehicles		1953	0.0	0.714	14.6	LOS B	22.4	156.7	0.62	0.59	41.5

Bidwill Street/ Wallace Street intersection PM peak: With ongoing construction

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Wallace Street											
1	L2	95	0.0	0.710	16.1	LOS B	24.2	169.1	0.63	0.62	46.3
2	T1	872	0.0	0.710	8.0	LOS A	24.2	169.1	0.63	0.62	46.3
3	R2	25	0.0	0.284	58.1	LOS E	1.2	8.1	1.00	0.69	23.0
Approach		992	0.0	0.710	10.0	LOS B	24.2	169.1	0.64	0.62	45.1
East: Massey Uni											
4	L2	40	0.0	0.541	48.5	LOS D	5.3	37.4	0.97	0.79	26.1
5	T1	45	0.0	0.541	40.3	LOS D	5.3	37.4	0.97	0.79	26.1
6	R2	40	0.0	0.541	48.6	LOS D	5.3	37.4	0.97	0.79	26.1
Approach		125	0.0	0.541	45.6	LOS D	5.3	37.4	0.97	0.79	26.1
North: Wallace Street											
7	L2	69	0.0	0.513	13.3	LOS B	12.5	87.5	0.46	0.47	49.3
8	T1	605	0.0	0.513	5.7	LOS A	12.5	87.5	0.46	0.47	49.3
9	R2	29	0.0	0.130	25.7	LOS C	0.8	5.6	0.63	0.75	35.0
Approach		703	0.0	0.513	7.3	LOS A	12.5	87.5	0.47	0.48	48.4
West: Bidwill street											
10	L2	60	0.0	0.714	51.3	LOS D	7.7	54.0	1.00	0.88	25.2
11	T1	50	0.0	0.714	43.1	LOS D	7.7	54.0	1.00	0.88	25.2
12	R2	60	0.0	0.714	51.4	LOS D	7.7	54.0	1.00	0.88	25.2
Approach		170	0.0	0.714	49.0	LOS D	7.7	54.0	1.00	0.88	25.2
All Vehicles		1990	0.0	0.714	14.6	LOS B	24.2	169.1	0.63	0.60	41.4

Appendix C

Commuter Pedestrian Routes


Main pedestrian commuter routes into the CBD or Newtown (to the hospital , Te Whaea, secondary schools, Massey University etc)
Other pedestrian commuter routes
Bell Road
To Massey /Wellington High
City to Sea Walkway
To Wellington High/Massey Uni
Pathway Closed
Try & keep this connection
Rolleston Street
Hargreaves Street
Pathway Closed
Bell Road
This route through the construction site from Dorking Rd/ Asquith Terrace is used by students (Wgtn High, Wgtn College) & Massey Uni.
Construction Zone
Formed Paths
Pathway Closed
Pathway Closed
Salisbury Terrace
Dorking Road
Dorking Road
City to Sea Walkway
Salisbury Terrace
Westland Road
To Te Whaea, Wgtn Hospital

Appendix D

CAS Analysis report for 2012-2016 Coded Crash Report

CRASH ROAD	CRASH DIS	CRASH DIR	INTSN	SIDE ROAD	CRASH ID	CRASH DATE	CRASH DO	CRASH TIN	MVMT	VEHICLES	CAUSES	OBJECTS S	ROAD CUR	ROAD WE	LIGHT	WTHRa	JUNC TYPE	TRAF CTRL	ROAD MA	SPD LIM	CRASH FA	CRASH SE	CRASH MI	PERS AGE1	PERS AGE2
BIDWILL ST	20	W		WALLACE	2.02E+08	28/03/2015	Sat	1039	CC	CW1C	386A 404A 407A	FHM	R	D	B	F		N	C	50	0	0	0		
BIDWILL ST	30	W		WALLACE	2.02E+08	17/03/2016	Thu	1342	EA	XN1C	371A	M	R	D	B	F			C	50	0	0	0		
BIDWILL ST			I	WALLACE	2.02E+08	2/03/2016	Wed	1810	CA	ME1C	137A 181A		R	D	TF	F	T	T	C	50	0	1	0		
HARGREAVES ST			I	WALLACE	2.01E+08	8/11/2012	Thu	810	KA	SN2C	301B		R	D	B	F	T	G	C	50	0	0	0		
ROLLESTON ST	70	W		WALLACE	2.01E+08	3/09/2013	Tue	720	EA	CE1C	386A	M	R	D	DO	F		N	C	50	0	0	0		
ROLLESTON ST	150	W		WALLACE	2.02E+08	2/05/2015	Sat	1248	MO	CE1C	102A 428A	M	R	D	BF	F		N	C	50	0	0	0		
WALLACE ST	20	S		BIDWILL S	2.01E+08	23/12/2013	Mon	1430	FE	CW1CC	181A		R	D	BF	F		T	N	50	0	0	0		
WALLACE ST	40	S		BIDWILL S	2.02E+08	25/02/2015	Wed	1636	EA	CN1C	103A 129A	M	R	D	BN	F		N	C	50	0	0	0		
WALLACE ST	40	S		BIDWILL S	2.01E+08	7/06/2014	Sat	2245	JA	CS1C	303B 930		R	W	DO	L	D	N	C	50	0	0	0		
WALLACE ST	60	S		BIDWILL S	2.01E+08	20/12/2014	Sat	1100	MG	CS14	352B 371B		R	D	O	F		N	P	50	0	0	0		
WALLACE ST			I	BIDWILL S	2.02E+08	22/10/2015	Thu	2000	DA	4S1C	131A 404A	M	E	D	DO	F	T	T	C	50	0	0	0		
WALLACE ST			I	BIDWILL S	2.01E+08	30/09/2014	Tue	1510	QD	CE2T	611A		R	D	B	F	T	T	C	50	0	0	0		
WALLACE ST			I	BIDWILL S	2.01E+08	25/09/2013	Wed	700	KA	TN1C	322A 334A		R	W	O	H	T	T	C	50	0	0	1		
WALLACE ST	40	N		FINLAY TE	2.01E+08	6/06/2012	Wed	2230	FC	CN1C	181A 331A 402A 801		R	W	TO	F		N	X	50	0	0	0		
WALLACE ST	5	N		HARGREA	2.01E+08	10/03/2013	Sun	1150	LO	SW1C	204A 830B 929		R	D	B	F	D	N	C	50	0	0	0		
WALLACE ST	10	N		HARGREA	2.01E+08	19/10/2013	Sat	1223	GA	MS1C	181A		R	D	B	F	T	N	P	50	0	0	1		
WALLACE ST	10	N		HARGREA	2.01E+08	3/10/2013	Thu	1805	FC	MN1C	181A 402A		R	D	O	F	T	N	C	50	0	0	0		
WALLACE ST	20	N		HARGREA	2.02E+08	13/04/2015	Mon	2107	FC	CN14	103A 331A 358A		E	D	DO	F		N	X	50	0	0	0		
WALLACE ST	30	N		HARGREA	2.02E+08	27/05/2016	Fri	1915	FD	CS1X	181A 331A		E	W	DO	L			C	50	0	0	0		
WALLACE ST	40	N		HARGREA	2.02E+08	5/10/2015	Mon	1800	FC	CS1C	181A 330A		R	D	B	F			C	50	0	0	0		
WALLACE ST	50	N		HARGREA	2.02E+08	14/02/2016	Sun	1920	FO	CN1CC	331A 352A		E	D	BF	F		G	X	50	0	0	0		
WALLACE ST			I	HARGREA	2.01E+08	1/11/2012	Thu	1420	KA	CN1C	309B		R	D	B	F	T	G	N	50	0	0	0		
WALLACE ST	10	N		ROLLESTO	2.02E+08	17/08/2015	Mon	1939	FD	CS1C	181A		R	D	TO	F	T		C	50	0	0	0		
WALLACE ST	5	S		ROLLESTO	2.02E+08	26/06/2015	Fri	1050	FC	CS1CC	331A 191B		R	D	B	F	T		X	50	0	0	1		
WALLACE ST	10	S		ROLLESTO	2.01E+08	16/08/2012	Thu	829	FA	CN1C	331A 351A		R	D	B	M	T	N	P	50	0	0	0		
WALLACE ST	30	S		ROLLESTO	2.02E+08	1/06/2016	Wed	530	FD	CN1CC	331A 363A		R	W	DO	M			P	50	0	0	0		
WALLACE ST	40	S		ROLLESTO	2.01E+08	28/10/2012	Sun	1050	FA	CN1V	181A 359A		R	W	B	F		N	C	50	0	0	0		
WALLACE ST	40	S		ROLLESTO	2.02E+08	6/02/2015	Fri	1857	FA	CS1C	103A 351A		E	D	B	F		N	R	50	0	0	0		
WALLACE ST	50	S		ROLLESTO	2.01E+08	20/06/2013	Thu	1550	FD	CS1C	331A 350A		R	W	O	H		N	C	50	0	0	0		
WALLACE ST	60	S		ROLLESTO	2.01E+08	29/05/2014	Thu	2015	NA	CS1E	711B		E	D	DO	F		N	P	50	0	0	0		
WALLACE ST	60	S		ROLLESTO	2.01E+08	1/08/2014	Fri	2005	NA	CS1E	711B		E	W	DO	HS		N	X	50	0	0	1	19	
WALLACE ST	70	S		ROLLESTO	2.01E+08	19/08/2014	Tue	933	FC	PN1C	331A 358A		R	D	B	F			X	50	0	1	0		
WALLACE ST			I	ROLLESTO	2.01E+08	1/02/2012	Wed	1715	FD	CN1C	331A 354A		R	D	O	F	T	G	C	50	0	0	0		

Appendix E

Parking Survey Results

Intersection:	Wallace St/Rolleston St Intersection- PARKING SURVEY			Time Period:	5am-6am	
Date:	10-March (Friday)					
Street Name	Residential Occupied	Residential Empty	Coupon Occupied	Coupon Empty	Free Occupied	Free Empty
Rolleston St	22	3	40	11	0	0
Hargreaves St	6	12	20	7	0	0
Bidwell	10	8	12	8	0	0
Wallace St	11	4	7	2	0	1
Wright St	14	0	16	6	0	0
Hankey St	3	1	8	1	0	1
Papawai Tce	4	1	12	0	0	1
Finlay Tce	0	6	12	1	0	0

Intersection:	Wallace St/Rolleston St Intersection- PARKING SURVEY			Time Period:	12pm-1pm	
Date:	9-March (Thursday)					
Street Name	Residential Occupied	Residential Empty	Coupon Occupied	Coupon Empty	Free Occupied	Free Empty
Rolleston St	19	7	41	13	0	0
Hargreaves St	6	7	19	22	0	0
Bidwell	8	10	8	11	0	0
Wallace St	9	3	8	2	0	2
Wright St	8	14	19	6	0	0
Hankey St	3	2	8	0	2	1
Papawai Tce	4	1	8	4	0	0
Finlay Tce	3	6	12	1	0	5

Appendix F

Prince of Wales/Omāroro Reservoir Construction Traffic Management Plan (CTMP)

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Report

Prince of Wales/Omāroro Reservoir Construction Traffic Management Plan (CTMP)

Prepared for Wellington Water Ltd

Prepared by CH2M Beca Ltd

5 April 2017

Revision History

Revision N°	Prepared By	Description	Date
A	Shruti Gadgil	Draft for Wellington City Council Review	17/03/2017
B	Mark Read	Update following comments from WWL and WCC	5/04/2017

Document Acceptance

Action	Name	Signed	Date
Prepared by	Shruti Gadgil / Mark Read		05/04/2017
Reviewed by	Jamie Minchington		21/04/2017
Approved by	Wayne Estment		26/04/2017
on behalf of	CH2M Beca Ltd		

Executive Summary

This Construction Traffic Management Plan (CTMP) is an overarching document for the preparation of specific traffic management plans for the construction phase of the Prince of Wales/Omāroro Reservoir (the Project), in Wellington. The purpose of this document is to outline the anticipated construction method and how the transport effects of the construction phase will be managed.

This reservoir will service areas of Wellington central business district, Newtown, and Mount Cook and provide needed resilience to the wider network. It is expected that once construction begins, it will take two years to build. Subject to funding and obtaining required approvals and consents, the reservoir potentially could be completed by 2021.

This report highlights the construction routes, stages and number of heavy vehicles that are anticipated throughout the different stages of construction.

It also outlines procedures, requirements and standards necessary for managing traffic effects of construction arising from the project. It is anticipated that this document will be a 'live' document and will be updated and revised as the construction methodology, regulatory environment and requirements for implementation of traffic control change over the period of construction. This reflects the fact that the construction methodology will not be finalised until a detailed design is completed and detailed construction planning commences, at which time there will be a more comprehensive understanding of the impacts of the Project.

Contents

1 Introduction

1.1 Purpose and Scope

This Construction Traffic Management Plan (CTMP) is an overarching document for the preparation of specific traffic management plans for the construction phase of the Prince of Wales/Omāroro Reservoir (the Project), in Wellington. The purpose of this document is to outline the anticipated construction method and how the transport effects of the construction phase will be managed.

This report should be read in conjunction with the Traffic Impact Assessment (TIA) report. The TIA estimates and appraises the impacts of the Project's temporary traffic management activities and the proposed mitigation measures.

This document sets out those matters which can be defined now, and those where a targeted and tailored traffic management response needs to be confirmed later in the process. It is expected that the methodologies and mitigation measures specified in this document will be refined during the Site Specific Traffic Management Plan (SSTMP) development stage, at a time closer to commencement of construction.

The philosophy followed in developing the CTMP is to be responsive to and respectful of nearby resident and business needs, while seeking to keep the period of disruption to these same people to a minimum by achieving a quick and efficient construction phase.

While this document discusses physical works which will form part of the temporary works, it is important to note that it does not prescribe or limit the activities that will become part of the final design.

1.2 Performance Standards

Temporary Traffic Management (TTM) is governed by New Zealand legislation, in particular, the Land Transport Act 1998. Land Transport Rules made pursuant to that act, which relate to TTM, include:

- Land Transport (Road User) Rule 2004
- Land Transport Rule: Traffic Control Devices 2004
- Land Transport Rule: Setting of Speed Limits 2003.

NZ Transport Agency's Traffic Control Devices Manual (TCD Manual) provides guidance on industry good practice, including, where necessary, practice mandated by law in relation to the use of traffic control devices. The primary standard (which forms part of the TCD Manual) that will be adhered to in planning, coordinating and implementing TTM for the Project is the Code of Practice for Temporary Traffic Management (COPTTM).

2 Summary of Traffic Impacts and Mitigation

This section provides a description of the expected traffic management activities for the Project and an overview of the anticipated impacts of these activities. At the time of preparation of this Plan, the construction methodology necessarily remains under development and will continue to be developed until detailed design is complete and construction commences on site. Therefore, this plan reflects the understanding of expected traffic management methodologies for the required construction works and is based on similar construction activities across the Wellington Region and New Zealand.

2.1 Construction Staging

The overall work programme has been estimated to be 24 months. The main stages of construction will be:

2.2 Heavy Vehicle Movements

During each construction stage there will potentially be 15 to 50 heavy vehicles accessing the site via Rolleston Street across the different stages of construction. The majority of construction traffic movements into and out of the site associated with the disposal of surplus excavated material will be planned to occur between 9am and 3pm Monday – Friday and 7:30am – 6pm Saturday. It is expected that some movements will need to be undertaken outside these hours, such as large machinery deliveries and delivery of pre-constructed components to the site.

2.3 Proposed Routes

Figure 2-1 outlines the proposed heavy vehicle (HV) route to and from the worksite and landfill via Happy Valley Road, and other deliveries, including precast concrete panels via SH1.

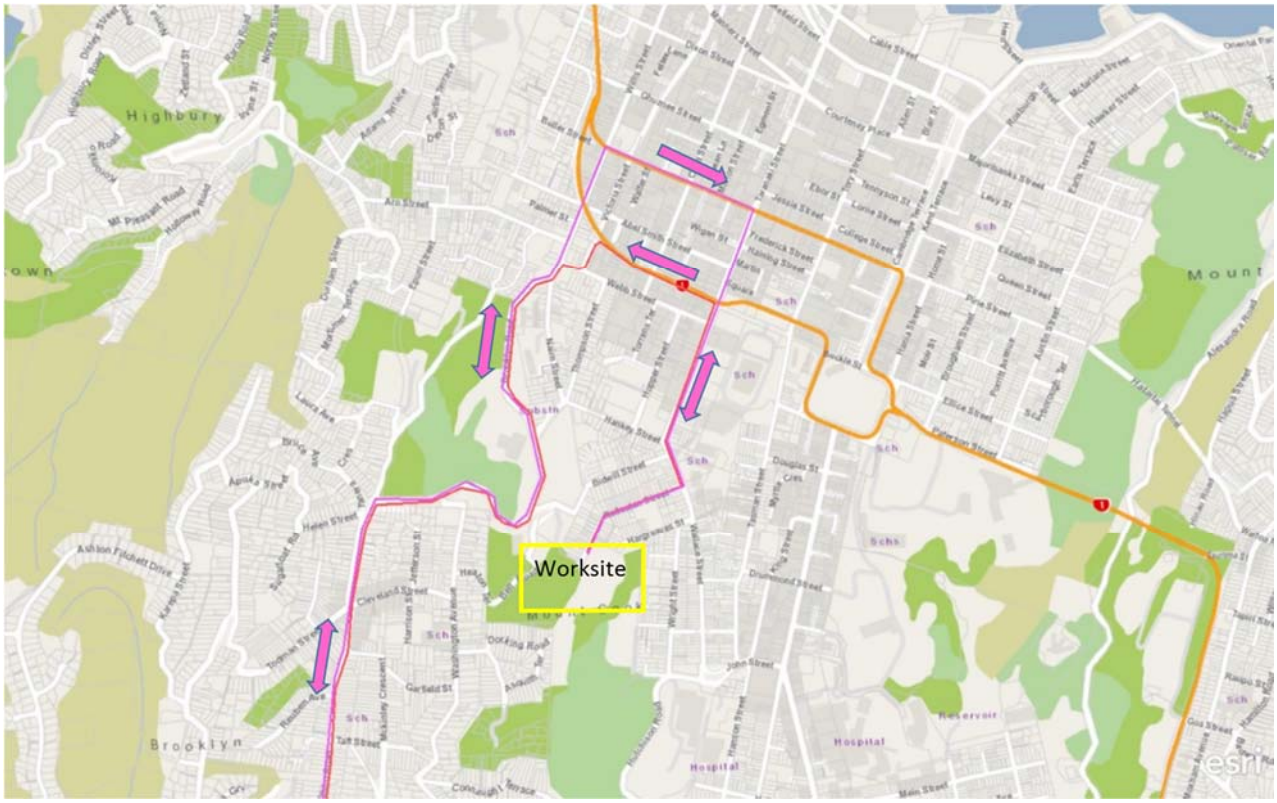

Figure 2-2-1: HCV Route from and to Landfill

2.4 Rolleston Street

The main access to the site will be via Rolleston Street. Parking for staff vehicles will be provided on the lower field and accessed via Salisbury Terrace. The overall site arrangement is shown Error! Reference source not found..

In order to ensure the safe turning of heavy vehicles in/out of the site, several on-street parking spaces will be temporarily removed from Rolleston Street during the construction period. During this phase parking will re-allocated to the affected residents and additional temporary parking provided on the upper field to replace parking removed from Rolleston Street. The temporary parking will be sealed and marked, have pedestrian access and be appropriately lit at night.

A temporary speed restriction along Rolleston Street of 30 kph for construction vehicles will be used throughout the construction period.

The Site and/or Project Manager will be responsible for communicating the site access limitations to all drivers and/or contractors bringing trucks to the site at the initial site induction safety briefings.

2.5 Rolleston/ Wallace Street Intersection

Heavy vehicles will be turning in/out of Rolleston Street at the Rolleston/Wallace Street intersection throughout the construction period.

Tracking of 9 m and 19 m rigid trucks was checked at the Rolleston/Wallace Street intersection to understand the width of road required by trucks to make a safe turn into and out of Rolleston Street. This

tracking demonstrated the need to temporarily remove several on-street parking spaces on Rolleston Street over the construction period and the need for manual traffic controllers to assist heavy vehicle movements.

Truck movements will be assisted at the intersection by assigning traffic controllers to stop vehicle movements on Wallace Street when required.

Heavy vehicle movements will be required co-ordinated to ensure that two trucks do not meet at the intersection at the same time. Radio contact when heavy vehicle movements to and from site are taking place will need to be maintained.

Figure 2-2: Site Access and Parking Arrangement

3 Implementation and Operation

3.1 CTMP Approval

As noted above, it is expected that the methodologies and mitigation measures specified in this document will be refined at a time closer to commencement of construction once the Project contractor is selected. The contractor will refine this CTMP and seek approval from WCC. This will then enable Site Specific Traffic Management Plans (SSTMPs) to be developed.

The CTMP can be reviewed and refined over the duration of the Project. A review could be triggered by and will need to address any significant changes to the construction methodology due to unforeseen issues, any WCC concerns, or arising from public suggestions or complaints.

3.2 Site Specific Traffic Management Plan (SSTMP)

SSTMP is the document that outlines the procedures and measures to be implemented so that safety is maintained for road users and Project staff throughout every activity associated with the Project. It will also outline the procedures required to be followed by construction or road workers in order to maximise the safety of the site.

The appointed contractor(s) for the Project will liaise early with WCC and agree on traffic management methodologies for key areas before completion of the detailed design or commencement of construction in accordance with local authority regulations. This will allow for responsive traffic management methodologies that reflect the requirements of WCC and the need for flexibility over timing, design and construction methodology.

A SSTMP will be prepared so that every construction activity which impacts on the road network is conducted using an approved methodology, with the agreed mitigation measures in place and to the correct standard. Each SSTMP will comply with the relevant standards of Code of Practice for Temporary Traffic Management (COPTTM) and WCC's Traffic Management Process.

Where it is not possible to adhere to this standard, the COPTTM's prescribed Engineering Exception Decision (EED) process will be followed, which will include appropriate mitigation measures agreed with the Wellington City Council (WCC).

The SSTMP will be submitted to WCC for approval or a site traffic management supervisor to whom WCC have given delegated authority.

Temporary traffic management will only be carried out by warranted site traffic management supervisors (STMS) and traffic controllers trained by NZ Transport Agency accredited trainers.

3.3 Traffic Management Communications

It is expected that communication campaigns will be undertaken for a wide variety of traffic management activities throughout construction of the Project. The overall strategy for communication management will be outlined in a separate plan at a later stage.

Communication associated with traffic management activities will be undertaken on a case-by-case basis depending on the location and impact of the construction and traffic management activities. Communication may include some or all of the following, as part of a project communication plan:

- Variable Message Signs (VMS) strategies, information boards or driver information signage installed
- Letter drops to affected residents and / or businesses which are located within or adjacent to the construction zone
- Flier drops to cars parked in affected areas in advance of works in the area
- Use of project signage or information boards where necessary
- Public notifications in local newspapers
- Advertising on radio or through internet and/or social media where necessary
- Web based resources.

3.4 Monitoring

The STMS noted in the SSTMP will be responsible for monitoring queuing and delays within Project worksites and frequently inspecting worksites to check all TTM (temporary traffic management) equipment is maintained in accordance with the approved SSTMP and in accordance with COPTTM.

It is anticipated that the TTM will be subject to random audits by either WCC or a party external to the preparation of SSTMPs and implementation of traffic control. The procedure for carrying out an audit of traffic management activities is prescribed in COPTTM.

3.5 Communication and Complaints Procedures

Wellington Water have in place communication and complaints protocols seeking good quality communication and responsiveness to issues.

Any communications issued will include contact details for the contact to whom any complaints are to be directed. Any comments will be quickly communicated to the relevant project staff and a response provided and actions taken as appropriate. Should any changes be required to the approved CTMP or any SSTMP, a record of the change itself shall be kept, including by way of the Council authorisation process. A full record of complaints and responses shall be maintained by way of a complaints register, available for inspection on site at all times.