

## 13. Construction traffic

The Construction Traffic Assessment Report provides an assessment of the effects on the local and regional transport network in relation to the construction of the Project.

The Report discusses the relevant performance standards and specifications in relation to the management of construction traffic for the Project. The Transport team assessed the construction traffic effects of the Project by identifying where construction activities (physical works and construction related vehicle movements) would potentially impact on users of the transport network. The Transport team then considered these activities in relation to their impact on performance and safety of the network.

The following is a summary of the key issues and potential effects identified in the Construction Traffic Assessment Report. This summary and the Report subsequently inform the recommended mitigation contained in Section 28 and will inform the Project conditions.

### 13.1 Existing traffic environment

The SH1 corridor from Pūhoi to Warkworth is primarily characterised by rolling or steep terrain with some particularly low speed horizontal curves and steep grades. The route is primarily a single carriageway with some passing lanes. The majority of the route has a posted speed limit of 100kph. Warkworth experiences significant congestion during holiday periods and also during weekday evening commuter peak and on weekends.

The 2012 AADT volume is approximately 17,400 vpd for the Pūhoi to Warkworth section of SH1. SH1 carries high volumes of freight traffic, with up to 7%<sup>90</sup> of traffic being HCVs along the route between Pūhoi and Warkworth.

The section of SH1 between the NGTR and Warkworth and the NGTR has a poor crash history. There is an average of 13 injury crashes per year on SH1 between Pūhoi and the proposed northern connection with the Project.

### 13.2 Assessment methodology

The Transport team has assessed the nature and scale of effects that the construction of the Project will have on the transport network.

The approach used by the Transport team was to identify:

- Locations where construction operations would directly affect the existing roading network, ie where temporary traffic management measures would need to be put in place;
- Construction access points required for staff, equipment and material; and
- The number of vehicle movements associated with construction of the Project, their origins and destinations.

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<sup>90</sup> Refer Construction Traffic Assessment Report Section 1.7

The Transport team considered the methods that the NZTA would typically use to manage construction traffic, and then assessed:

- The effects of traffic management measures; and
- The effect of construction traffic moving through the transport network for a typical construction.

### 13.2.1 Construction Traffic Management Plan

The NZTA will develop a Construction Traffic Management Plan (CTMP) as part of the outline plan of work (OPW) process for the Project. The NZTA will produce Site Specific Traffic Management Plans (SSTMPs) for each activity in accordance with COPTTM, to demonstrate to the Auckland Council and Auckland Transport (as the local Road Controlling Authority) that the effects of the construction activity on the transport network will comply with designation conditions, and will minimise disruption wherever practicable. The Transport team has factored in the development of the CTMP and the SSTMPs into the assessment of the construction traffic effects of the Project.

The CTMP will incorporate the following objectives for the delivery of Temporary Traffic Management (TTM) during the construction of the Project:

- 1) Provide TTM complying fully with the COPTTM wherever practicable. Non-compliance will be addressed through Engineering Exception Decisions signed off by the implementation team and the relevant RCA.
- 2) Focus on current best industry standards with regard to TTM and safety.
- 3) Minimise disruption on the State highway and local roads wherever practicable.
- 4) Maintain existing flows and travel times on State highway and local roads adjacent to the work site where practicable.
- 5) Minimise the impact of works on pedestrians and cyclists wherever practicable.
- 6) Minimise the effects of construction traffic on local roads used for access wherever practicable.
- 7) Minimise the impact of construction parking wherever practicable.
- 8) Develop SSTMPs having consideration for key stakeholders ie (mainly local residents and Auckland Transport, but also the wider travelling public).
- 9) Identify all issues and have a planned SSTMP approved at least five days before implementation is required, in consultation with the applicable RCA and the NZTA's network management consultant.
- 10) Provide effective communication to affected parties and the travelling public.
- 11) Implement TTM that provides stakeholders with exceptional service in terms of functionality and clarity of direction of travel through roadwork sites.

These objectives can be achieved through the implementation of the CTMP and associated SSTMPs to ensure the overall effects of construction will be minor.

### 13.3 Temporary traffic management effects and mitigation

The Transport team has assessed the effect of construction activities by considering the location and scale of construction activities and associated TTM measures on the existing network. The

Transport team used a qualitative assessment to determine the likely level of impact from the activities. This assessment was based on the team's experience and understanding of capacity reductions and delays caused by traffic management activities.

The Transport team also assessed the potential for alternative routes to be used as detour routes if roads were to be closed for a given time. As part of developing the CTMP and associated SSTMPs, the contractor will consider the suitability of detour routes where short-term road closures are considered necessary to facilitate construction works.

The key locations where construction activities are likely to affect operating conditions on existing road networks are:

- SH1 at the southern tie-in;
- Pūhoi Interchange – SH1 and Pūhoi Road;
- SH1 at Hungry Creek;
- Moirs Hill Road;
- Wyllie Road;
- Woodcocks Road / Carran Road;
- SH1 at the northern tie-in; and
- Construction site access directly to SH1.

### **13.3.1 Southern tie-in**

Construction activities in this area will focus on the integration of the existing Hibiscus Coast Highway and SH1 alignments with the Project.

The works are likely to require speed and lane width restrictions, and potentially the use of the opposing carriageway near to the tunnel portals. There may be some minor temporary loss of road capacity over the duration of TTM operations but a single lane of traffic will be maintained in each direction with the main impact being a reduction in speed limit.

The Transport team recommends that the NZTA schedule works that significantly reduce capacity outside of peak holiday periods and develop an extensive communication campaign in advance of significant works components to inform motorists of road layout changes and potential delays.

The Transport team considers that construction activities can be undertaken and managed so that the effects on SH1 are minor.

### **13.3.2 Pūhoi Interchange – SH1 and Pūhoi Road**

Works in this area will involve the construction of the Pūhoi Interchange and Viaduct. The construction of the south-facing ramps will largely be undertaken outside the existing SH1. Shoulder closures over an 18 month period covering two construction seasons will be required to facilitate the tie-in of the ramps to the existing SH1 alignment and Pūhoi Road.

Some works will require operations in or over existing traffic lanes, such as the installation of bridge beams. To facilitate this, closures of Pūhoi Road may be required for short durations. These

closures will generally be scheduled to occur at night or during other periods of low demand, with cessation of works if delays are excessive, queues extend to SH1 or emergency access is required.

Traffic counts of the peak periods undertaken by the Transport team on Tuesday 21 May 2013 indicate that even during the peak periods, the maximum hourly two-way volume on Pūhoi Road is approximately 170vph. This volume is less than three vehicles per minute on average. Due to low volumes of traffic on Pūhoi Road, construction works and associated TTM are unlikely to greatly affect traffic.

NZTA will manage traffic at the SH1 / Pūhoi Road intersection to minimise disruption and delays. The Transport team recommends extensive communication campaigns in advance of significant works to assist motorists to make informed decisions regarding trip planning.

### 13.3.3 Hungry Creek

The indicative alignment passes close to the existing SH1 at two locations around Hungry Creek. Works in this area will include earthworks, retaining wall construction and construction of the Watson Road underpass.

These works will likely require shoulder closures, temporary speed restrictions and may potentially necessitate the closure of the southbound overtaking lane to facilitate site access over a 30 month period.

The Transport team considers that the closure of the overtaking lane is unlikely to have a significant impact on either the capacity or operating conditions on the existing SH1 and concludes that construction activities can be undertaken and managed so that effects are minor in this location.

### 13.3.4 Moirs Hill Road

The Design team has identified Moirs Hill Road as a critical access point for construction activities between the Schedewys Hill Viaduct and Perry Road Viaduct. Moirs Hill Road is an unsealed road serving several rural-residential properties. It is narrow, winding and extends through challenging topography. The initial section is too narrow for one vehicle to pass another and extends between a steep embankment on one side and a steep drop on the other.

The proposed designation boundary allows for the reconstruction of Moirs Hill Road from SH1 to the alignment to allow two truck and trailer units to be able to pass. Such works will be undertaken if determined necessary as part of the detailed construction methodology. Reconstruction works would likely require alternating flow under stop/go or portable traffic signals, for an estimated works period of six months.

Moirs Hill Road will be widened and realigned near to the new motorway to enable the construction of the Moirs Hill underpass. These realignment works will occur off-line. Where it connects to the existing Moirs Hill Road alignment, works are likely to require temporary diversions or alternating flow operations.

The Transport team undertook surveys of Moirs Hill Road in the AM and PM peaks on Tuesday 21 May 2013. The maximum number of vehicles using Moirs Hill road (2-way) over any one hour (8:00am to 9:00am) was 27 vehicles with no observed trucks and two bus movements. Given the traffic volumes on Moirs Hill Road are very low, the Transport team considers that the construction activities can be undertaken and managed to have only minor effects.

### 13.3.5 Wyllie Road

Wyllie Road is a no-exit unsealed road that services approximately 40 properties. Wyllie Road may potentially be impacted on by works undertaken to facilitate construction of embankments and a bridge structure, and works to widen Wyllie Road and allow for two-way operation and pedestrian access under the bridge.

The Transport team anticipates that construction works in this location will necessitate shoulder closures and alternating flow under stop/go control over a 12 month period. The team recommends that access be maintained at all times throughout construction of the Project as there is no feasible alternative access.

Some works will require operations in or over existing traffic lanes, such as the installation of bridge beams. To facilitate this, closures of Wyllie Road may be required for short durations. The Transport team recommends that these closures generally be scheduled to occur at night or during other periods of low demand, and that works should cease if delays are excessive, or emergency access is required.

Due to the very low traffic volumes on Wyllie Road, the Transport team considers that the construction activities can be undertaken and managed so that effects are minor.

### 13.3.6 Woodcocks Road / Carran Road

As part of the Project works, Woodcocks Road will be realigned to provide better sight distance under the RoNS carriageway, and the intersection with Carran Road will be reconstructed. Shoulder closures and alternating flow under stop/go control will be required to facilitate construction, as required over a six month period.

The Transport team observed stop/go operations on Woodcocks Road as part of a road reconstruction project on 14 May 2013 and concluded that these operations were appropriately managed so that delays were acceptable.

Construction activities relating to the construction of the Woodcocks Road Viaduct and widening of Woodcocks Road where it passes beneath the Viaduct will largely occur offline.

Some works will require operations in or over existing traffic lanes, such as the installation of bridge beams. To facilitate this, closures of Woodcocks Road may be required for short durations. The Transport team recommends that these closures generally be scheduled to occur at night or during other periods of low demand, and that works should cease if delays are excessive, or emergency access is required.

With the availability of Carran Road as a possible detour route, the NZTA may have some flexibility in managing the works in this area so as to accelerate launching of the viaduct sections.

Given the AADT on this section of Woodcocks Road of 2,500 vpd and the availability of Carran Road as a detour route, the Transport team considers that the Project construction activities can be undertaken with effects that are minor.

### **13.3.7 Northern tie-in**

The majority of works associated with the construction of the tie-in of the new motorway with the existing SH1 will be undertaken offline. Temporary roads will need to be constructed and contra-flow operations implemented to minimise delays to road users over an 18 month construction period. The Transport team anticipates that the northbound passing lane on the existing SH1 will be closed for six months to facilitate site access and the construction of the tie-in to the indicative alignment.

Two-way operation will be maintained during the construction period with lane and shoulder narrowing as necessary. Speed restrictions may lead to some minor reduction in capacity and minor increase in delays. The Transport team recommends SSTMPs be developed for this section of the Project to minimise impacts and mitigate effects associated with TTM.

The Transport team considers that the construction activities can be undertaken and managed so that the effects on SH1 are minor.

### **13.3.8 Conclusion – temporary traffic management**

The Transport team considers that the effects of the temporary traffic management activities can be effectively managed to minimise disruption through the implementation of CTMPs and SSTMPs.

## **13.4 Construction traffic volumes**

The Design team has estimated potential traffic volumes travelling to and from offsite locations (eg from sources of materials and products) using the location of construction zones and programme provided in the construction methodology and detailed in Section 6 of this AEE. These volumes were developed by an experienced construction engineer based on the number of staff required at each site and the volume of construction equipment and materials required to construct the project.

The preliminary construction methodology is based on all of the earthworks being contained within the proposed designation. Therefore, there will be no vehicle movements associated with hauling surplus material off-site along SH1 or the existing local roads. Use of internal haul roads in this manner is consistent with the methodology set out in the indicative construction programme.

The Transport team has used these estimated traffic volumes to assess the effects of construction traffic on the existing road network.

The Transport team used these traffic volumes (and an assessment of whether the origin or destination of the movements to the north or the south of the site), to develop turning movements

at the point where construction traffic accesses the public road network (as shown in Drawings CT-101 and CT-102).

There will be some variation in the number of vehicle movements into and out of a site throughout the duration of construction. During some periods a site access may not be in use as construction has not started (or has been completed) or there is limited activity taking place. During critical periods, there may be increased activity. For example, there may be a larger number of trucks into and out of a bridge staging site as beams are being transported to site for launching or while part is being delivered to site.

The number of vehicle movements on a 'typical' day represents the number of movements that would be expected to access a site on an average day when it was operating. The 'peak' day represents the number of movements on a day when the site is in peak operation over a much shorter duration.

The Transport team used the peak volumes to assess the performance of individual accesses during their peak usage. The cumulative typical traffic volumes from all sites were used to assess the performance of the network assuming every site is operating at the same time.

The final construction methodology is not confirmed at this stage and is subject to change following the appointment of a contractor. However, the Transport team considers that the Construction Traffic Assessment Report takes a conservative approach to developing the traffic volumes for the following reasons:

- The Transport team assumed that peak hour traffic volumes were 10% of the total assessed daily construction traffic volumes. However, shifts are likely to be 12 hours and construction traffic would be likely to be spread relatively evenly over this period. This assumption means that volumes in the assessment are likely to be more peaked than would be observed in reality;
- Many of the light vehicle movements are likely to take place at the start and end of shifts (nominally 7am and 7pm). These will not coincide with the peak traffic volumes on the adjacent roads;
- The Transport team identified a range of vehicle movements. The maximum of these ranges has been added cumulatively and used in the assessment. It is unlikely that the maximum of all these ranges would all occur at the same time. As a result, this approach is likely to significantly overstate the number of movements that could be expected;
- For simplicity, the Transport team assumed that all trips are destined for a location north or south of the Project extents. In practice some of the movements will be from one site to another. For example, a trip taking precast bridge units from the precast yard to sites 7 or 8 will only travel from Warkworth to Moirs Hill Road rather than all the way south; and
- The development of the CTMP for the Project will enable the NZTA and its contractors to fully programme their activities to maximise the efficiency of their operations by avoiding congested periods, and minimising the effects of their activities on the existing road network.

The Transport team has estimated the cumulative increase in traffic volumes on sections of the existing SH1 for a typical working day during construction. Table 13-1 shows the projected increase in traffic on the existing SH1 attributable to the construction of the Project.

**Table 13-1: Cumulative traffic increase on SH1 in each direction during construction**

Section of SH1	Cumulative traffic increase (vpd)*
South of Johnstone's Hill	410-1020
Pūhoi Road to Hungry Creek	320-870
Hungry Creek to Schedewys Hill	290-810
Schedewys Hill to Moirs Hill Road	270-770
Moirs Hill Road to Perry Road	210-670
Perry Road to Woodcocks Road	170-700
Woodcocks Road to northern tie-in	90-540
North of northern tie-in	80-520

\* Note that figures relate to a typical day with all sites operating

### 13.5 Construction traffic effects

The Transport team assessed the effects of construction traffic on the wider network by using the cumulative typical day traffic volumes, assuming every site is operating at the same time. This approach is considered conservative as all sites will not be operating at the upper end of the typical day volumes at the same time. In fact it is unlikely that all sites will be operating at the same time at all. Cumulative peak day volumes have not been assessed as all sites will not be operating at their peaks at the same time.

#### 13.5.1 Effects of construction traffic on SH1

The Transport team assessed the effects of construction traffic on the existing SH1 by determining the spare capacity on SH1 to accommodate the expected construction traffic volumes.

The Transport team obtained existing traffic flow profiles from the NZTA's permanent traffic count site south of McKinney's Road and added 4% per annum traffic growth (consistent with that observed over the last 5 years) to these profiles to develop a baseline 2016 profile.

The traffic profiles calculated in the Construction Traffic Assessment Report demonstrate that, with the inclusion of the forecast construction traffic volumes, the peak traffic volume is likely to be in the order of 1,000vph per direction against the nominal capacity of 1,300vph per direction. These traffic volumes indicate that even with the additional construction traffic, SH1 will be operating within its capacity with minimal impact on delays. The Transport team considers that even if a very

worst case assumption was used where all the sites were operating concurrently at their peak traffic volumes, there would still be additional capacity available on SH1.

There will be a large number of additional heavy vehicle movements on SH1 as a result of the additional construction traffic. For example the number of construction related HCVs forecast to be on SH1 south of Pūhoi Road is approximately 420vpd. If this number of additional HCVs were included onto SH1 at the moment, this would have the effect of increasing the HCV proportion from approximately 7% to 9%. The Transport team does not consider that this level of additional HCVs would have a significant effect on the operation of SH1. However, there will be some larger or oversized loads as part of the construction traffic which would need to be scheduled to avoid peak traffic periods.

The exceptions to spare capacity on SH1 being available are the peak periods of Friday afternoon (northbound), Saturday morning (northbound) and Sunday afternoon (southbound). During these periods, traffic volumes on SH1 will reach or exceed the nominal capacity of SH1. As the volumes approach capacity of SH1, congestion will increase and travel times will increase. The Transport team recommends that as part of the CTMP, the NZTA will need to monitor delays on SH1. If significant delays are observed NZTA will need to consider restricting construction movements during these peak periods to ensure that delays to general traffic (and their construction traffic) are maintained at a manageable level.

The Transport team expects the increase in vehicle movements through the Warkworth Township north of Woodcocks Road (including the signalised intersections) as a result of the Project to range from 10-55 vph on a typical day. To put this in context through Warkworth, this would equal a maximum of 2 vehicles per traffic signal cycle in each direction (based on a 120 second traffic signal cycle). The Transport team recommends that the NZTA give consideration to scheduling (through the CTMP) Project construction vehicle movements to avoid the peak periods if delays are observed to increase to unmanageable levels.

The Transport team considers that the effects of the traffic generated by the construction activities are likely to be minor based on the capacity of SH1 to accommodate additional traffic for most of the week during the earthworks season. The CTMP will allow the NZTA to manage the construction traffic movements to minimise the impact on the travelling public and maximise the efficiency of the construction operations.

### 13.5.2 Effects on local roads

The Transport team assesses that the effects of cumulative construction traffic on the majority of local roads will be minor. However, there are two locations where the construction traffic volumes are likely to be highest. These locations are:

- Moirs Hill Road; and
- Woodcocks Road /Wyllie Road.

**(a) Moirs Hill Road**

Moirs Hill Road has been identified as a critical access route for construction activities between the Schedewys Viaduct and Perry Road bridges. The forecast construction traffic volumes range from 200vpd to 840vpd, which represent a low range for a typical day and a high range for a peak day, respectively. The Transport team considers these volumes to be relatively low, representing less than 1.5 additional light or heavy vehicle movements per minute on average. However, as Moirs Hill Road is very lightly trafficked (with the highest observed peak hour two-way traffic volumes in the order of 30vph) the relative increase will be noticeable.

The proposed designation boundary has been extended to allow for the reconstruction of Moirs Hill Road from SH1 to the indicative alignment if deemed necessary. These works will remove potential conflict of passing traffic in the one-way area near SH1 and allow two truck-and-trailer units to pass each other. As such, Moirs Hill Road will be relatively unaffected by construction traffic in terms of capacity. The Transport team considers that with these improvements in place, the effect of construction traffic in relation to the operation of Moirs Hill Road will be minor.

**(b) Woodcocks Road / Wyllie Road**

The construction activities at sites in the vicinity of Woodcocks and Wyllie Roads will generate traffic that will use Woodcocks Road south of the Carran Road intersection. The Transport team expected these sites to generate between 200-1240vpd, which represents a low range for a typical day and a high range for a peak day, respectively. This indicates peak hour 2-way traffic volumes of 20-124vph (each way). These volumes are equivalent to approximately one vehicle per minute in each direction. The Transport team does not expect these volumes to have a significant effect on the operation of Woodcocks Road. However, potential conflicts and pedestrian safety risk may increase in the vicinity of Mahurangi College.

To avoid this potential effect, the Transport team recommends that works be scheduled (through the CTMP/SSTMP) so that heavy vehicle movements do not use Woodcocks Road during the start and end of the school day when large numbers of students are expected to be crossing Woodcocks Road. The use of the alternative route via Carran Road and Kaipara Flats Road may also be desirable during these periods. The NZTA will need to ensure detailed safety briefings are given to all truck drivers during project inductions and as part of regular 'Tool Kit' sessions to highlight the hazards through this area with consideration given to reducing their speed to 30-40kph on the approach to the school as this will have little impact on delays to construction traffic.

Additional construction traffic will use the Woodcocks Road / Wyllie Road intersection, which is currently controlled by give way to give priority to Woodcocks Road. Given the low background traffic volumes on both of these roads, the intersection is expected to work within its capacity, even with the additional construction traffic. Through traffic on Woodcocks Road would not be affected. The worst performing movement at the intersection would be the right turn out of Wyllie Road into Woodcocks Road, which is forecast to operate with average delays in the order of 15 – 19 seconds evening with peak day construction traffic volumes. The Transport team considers this effect to be a minor due to the low volumes of traffic using Wyllie Road.

Although volumes across the one-way bridge on Woodcocks Road will increase as a result of additional construction traffic, the Transport team considers the bridge will continue to operate well within its capacity in a peak hour with peak day construction traffic included. Average delays of less than 15 seconds are forecast even with the additional construction traffic included. Given the relatively low volumes of general traffic on Woodcocks Road, the Transport team considers construction traffic to have a minor impact on the performance of the one-way bridge.

The Transport team expects the maximum increase in vehicle movements associated with construction traffic at the SH1 / Woodcocks Road intersection to be in the order of two additional vehicle movements to and from Woodcocks Road per traffic signal cycle (based on a 120 second traffic signal cycle). The Transport team considers that this level of additional traffic can be accommodated by the traffic signals with only minor delays for other vehicles and that signals will operate at the same level of service as present with around 25 seconds of average delay.

The Transport team concludes that with the inclusion of appropriate safety measures into the CTMP (including careful planning to avoid/mitigate the potential for safety-related concerns associated with the peak pedestrian activity in the vicinity of the school), construction traffic effects on local roads can be managed so that they are minor.

### 13.5.3 Effects of construction accesses onto local roads and SH1

The Construction Traffic Assessment Report provides an assessment of proposed construction accesses onto local roads and SH1 and highlights the standards and potential issues associated with the establishment of unsignalised intersections. The Transport team selected access locations in order to provide adequate sight distances and deceleration zones along SH1. Options for potential improvements that would be considered as part of a CTMP are suggested in order to mitigate the potential effects of construction activities on the existing road network.

#### (a) Local roads

Access from the construction sites to local roads can be provided safely given the expected operating speeds and generally low traffic volumes on these roads, as follows:

- Sites 7 and 8 access onto Moirs Hill Road, which will provide sufficient additional capacity using a simple give way controlled access. Minimal delay to either local or construction traffic is expected.
- Sites 11 and 12 access onto Wyllie Road, which will provide sufficient additional capacity using a simple give way controlled access. Minimal delay to either local or construction traffic is expected.
- Site 13 access onto Woodcocks Road north of Carran Road. Analysis of a peak hour indicates that a give way controlled access will operate within its capacity, with no delays for through traffic and an average delay for the right turn out of the access itself of approximately 15 seconds.

It is considered that all access intersections would be sealed and constructed to allow for HCVs to turn and access sites without encroaching onto opposing lanes or verges. Some localised widening

around access may be required but should be able to be accommodated within the road reserve or the proposed designation. No specific additional treatment is required for accesses.

It is considered that construction vehicle movements onto and from local roads at site accesses can be managed so that effects are negligible.

#### **(b) SH1**

The Transport team concludes that access from the construction sites to SH1 can be provided safely given the expected operating speed of SH1 in these locations.

The Transport team recommends that for the expected volumes of traffic, all construction site accesses to SH1 should be designed to provide space for left-turning and right-turning vehicles to pull clear of through traffic. The following treatments should be implemented to mitigate effects of delays at intersections of site accesses and SH1 and to provide for their safe use by HCVs:

- Right turn and left turn bays for traffic leaving SH1; and
- Acceleration lanes for traffic turning right on to SH1.

The Transport team considers that there is sufficient space within the existing designation for SH1 to allow for these treatments.

The Transport team analysed potential delays at these intersections assuming these treatments are provided at each site access intersection with SH1. The results indicate that access into and out of sites onto SH1 are expected to operate at acceptable levels of service throughout a typical day and during peak days across a range of traffic volumes on SH1.

The intersection where the Transport team forecasts the most delay is at Moirs Hill Road, where average delays for right turning traffic into SH1 may increase from around 40 seconds to around 270 seconds on a peak day at the upper end of the range, assuming 1,100vph on SH1. General traffic making these movements will also be held up during these periods. However, the upper range of peak traffic for both sites 7 and 8 and these high volumes on SH1 are unlikely to coincide for long periods of time during construction. Where traffic volumes on SH1 increase above 1,100vph (Friday evenings, Saturday mornings and Sunday afternoons), delays at site access intersections should be monitored and managed as part of the CTMP.

The Transport team considers that any delay and safety issues for construction accesses onto SH1 can be adequately addressed through the CTMP.

### **13.6 Pedestrian and cycle effects**

Given the large distances between centres, there is limited opportunity for walking or commuter cycling between centres. There is the potential for a small number of pedestrian movements between Pūhoi and SH1 along Pūhoi Road to access the Inter City bus services. No roads that form part of the Auckland Regional Cycle Network are within the vicinity of the Project construction works. However, recreational cyclists do use the existing SH1. On SH1 through Warkworth, there are existing on-road facilities.

There will be some additional traffic on SH1 which could increase the exposure of pedestrians and cyclists to additional conflicts. However, given the relatively low proportion that construction traffic will make up of general traffic, the Transport team does not consider potential conflicts to be an issue.

The Transport team recommends that particular consideration should be given to scheduling work so that HCVs do not use Woodcocks Road at the start and end of the school day, and that safety briefings be provided for all HCV drivers, as mentioned above in Section 13.5.2. Carran Road and Kaipara Flats Road could be used as an alternative route for construction traffic at these times. The Transport team also recommends that due consideration be given in the development of the CTMP and SSTMPs to the safe passage of pedestrians and cyclists through areas controlled by temporary traffic management and routes used by construction traffic.

The Transport team considers that the effects of construction activities on pedestrians and cyclists can be managed so that they are no more than minor.

### **13.7 Passenger transport effects**

A small number of regular passenger transport services and a larger number of tourist shuttle services operate along the route. These bus and shuttle services utilise the existing SH1 and are subject to the same road performance conditions as general and freight traffic.

Regular passenger transport services allow pre-booked passengers to board and alight on SH1 at the Pūhoi turn off. The Transport team recommends that the NZTA consider providing a suitable location for a set-down area for buses to allow for passengers to safely board and alight and depart at Pūhoi.

The schools in Warkworth are well served by school buses using Woodcocks Road and Hill Street. Bus boarding and alighting takes place on Mahurangi College grounds and not on Woodcocks Road; accordingly, the Transport team does not anticipate any effects in this location due to construction traffic. Moirs Hill Road is also a school bus route.

Provided that access is maintained for these routes, the Transport team expects that effects on passenger transport during construction will be minor.

### **13.8 Overall assessment of effects**

The Construction Traffic Assessment Report (refer to Volume 3, Part 1) concludes that the effects of construction activities and construction traffic movements for the Project can be managed effectively through the development of a CTMP and SSTMPs as part of the OPW process.

There is flexibility available for the contractor to programme traffic movements and select routes in Warkworth to mitigate potential effects on the existing road network. Flexibility also exists in the staging of the northern and southern tie-ins to ensure that traffic is effectively managed through the construction period. The existing SH1 is expected to have sufficient spare capacity to accommodate additional construction traffic during most periods.

Effects on passenger transport are expected to be negligible and effects on pedestrians and cyclist are expected to be minor.

In general the effects outlined in this assessment are able to be mitigated acceptably provided a CTMP is developed and followed in line with normal NZTA practices.

### **13.9 Recommendations and mitigation**

The Report makes the following recommendations for measures to avoid, remedy or mitigate potential adverse effects:

- Staging of works at the northern and southern tie-ins should be communicated to the wider public to provide the opportunity to alter times of travel if needed;
- Dedicated acceleration lanes, right turn bays, and closure of passing lanes is likely to be required to facilitate access onto SH1 from the construction sites to ensure that construction movements can be made safely without significantly increasing delays to other road users. There is sufficient space on SH1 to provide for this;
- Access to Pūhoi Road, Moirs Hill Road and Wyllie Road will need to be maintained at all times as there are no feasible alternative routes. Short term closures or stop/go operations can be maintained on these roads without causing significant delays;
- Consideration will need to be given to providing a suitable location as a set-down area for buses to allow for passengers to board and alight and access Pūhoi;
- Construction traffic movements should be programmed outside of peak times of activity in the vicinity of Mahurangi College; and
- Management plans should be put in place to ensure that all issues can be managed to minimise disruption for road users.

With these recommendations and the development of a CTMP, the Transport team and I consider that the Project's construction traffic effects can be appropriately mitigated.