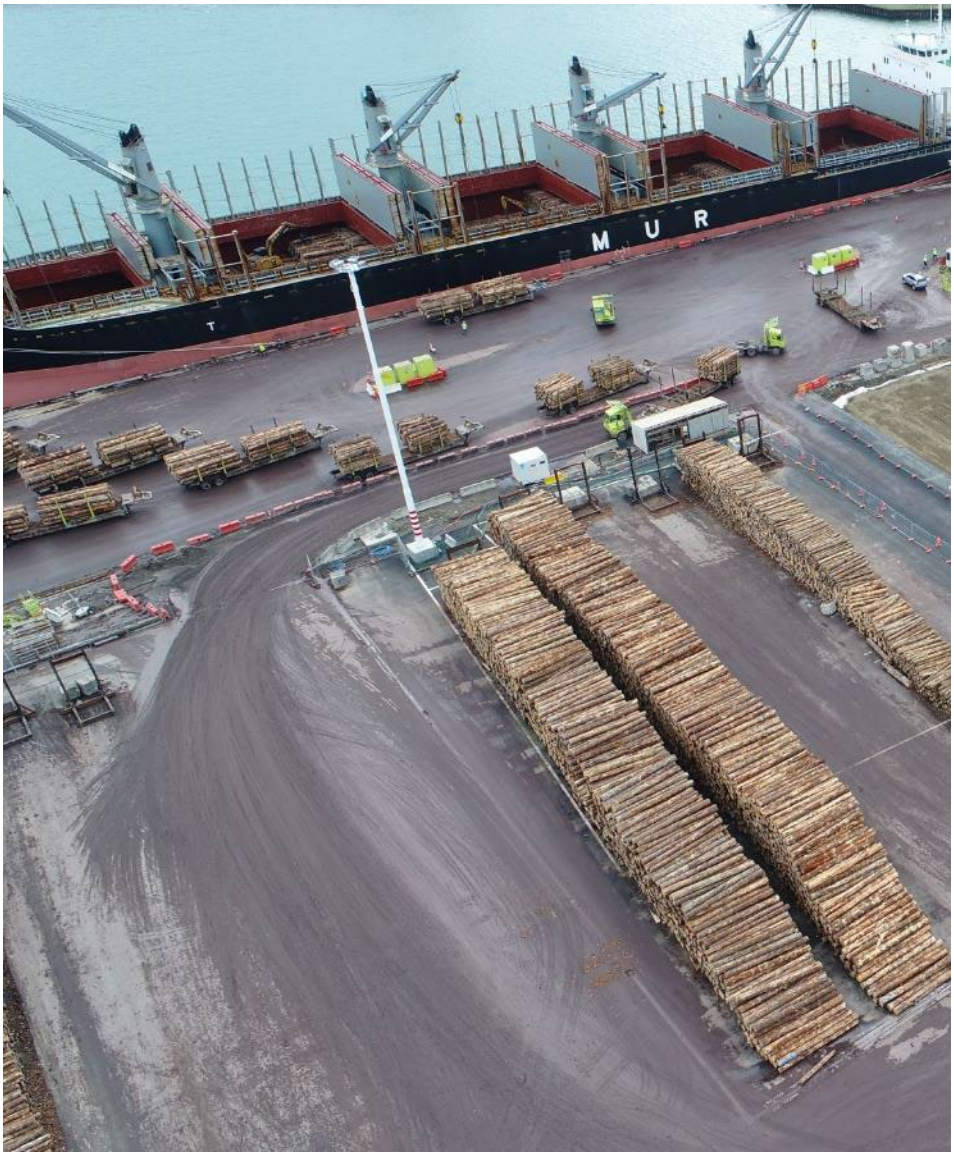
EASTLAND PORT LIMITED

Transportation Assessment Report



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1 INTRODUCTION

1.1 Overview

East Cape Consulting (ECC) has been engaged by Eastland Port Limited (EPL) to prepare a Transportation Assessment Report (TAR) for Stage 2 of its proposed expansion and upgrade of Eastland Port in Gisborne.

The full project is known as the Twin Berth Project (TBP) and is designed to enable two ships up to 200m long to berth at the port simultaneously, unlocking greater capacity for bulk freight and potential options for container freight in future. Stage 1 of the TBP was consented in December 2020. This stage provided for remediation of the former slipway to reduce its footprint within the port to enable more manoeuvring space for ships, and rebuilding of part of Wharf 6 and all of Wharf 7.

Stage 2 provides for the remaining works required to complete the TBP, and comprises the:

- Extension of the existing Wharf 8 structure into the area of the inner breakwater;
- Reclamation next to the Southern log yard;
- Rebuilding the outer breakwater structure;
- Deepening access channels in the outer port to accommodate larger Handymax vessels; and
- Improving stormwater collection and treatment facilities in the Southern log yard.

In this report we have assessed the transportation effects of Stage 2, which is referred to below as 'the Proposal'.

1.2 Scope

This TAR has been prepared in general accordance with the Integrated Transportation Assessment Guidelines published by Waka Kotahi (Research Report 422, November 2010). The following report:

- Describes the site location and the existing transport network;
- Describes the existing port and its traffic generation and parking demand characteristics (Including Stages 1 of the TBP);
- Explains the basis for the Proposal;
- Identifies planned changes to the transport network in the area that forms part of the existing environment;
- Assesses the levels of service currently provided by the network;
- Describes existing road safety performance;
- Estimates future traffic generation and parking demands at the port resulting from the Proposal;
- Assesses the Proposal's effects on existing and planned transport networks;
- Assesses the proposal against the relevant rules, policies and objectives of the Tairawhiti Resource Management Plan (TRMP); and

- Identifies conditions and mitigation works recommended to mitigate the transportation effects of the Proposal.

1.3 Summary of Conclusions and Recommendations

Eastland Port is currently handling an average of 10,330 m^3 logs per day[1]. At its peak, under its current configuration the port is capable of handling at least 16,135 m^3/day. However, its ability to achieve these peak volumes on a regular basis is impeded by weather and its existing single berth.

To meet forecast export log demand and reduce delays to ships waiting for a berth, Eastland Port needs to operate at these higher levels more consistently throughout the year and be more resilient to adverse weather.

The Proposal unlocks these constraints and is expected to increase the port's average daily throughput. However, it is not expected to significantly increase its *peak* daily throughput or its *peak* hour throughput because of other constraints including space, safety, and the availability of other resources as detailed further in this report. As a result, the Proposal is not expected to significantly increase peak daily or hourly vehicle movements – being a critical consideration from a traffic effects assessment.

The overall conclusions of this TAR are:

- The port is well located in terms of strategic transport network access with a purpose-built road connecting the site to the State Highway network via the SH35/Hirini Street intersection.

- The port is also well located in terms of walking and cycling infrastructure and has good catchments for walking and cycling as a means of travel for staff because of these networks and its central location.

- There are recognised safety and capacity issues at the SH35/Hirini Street intersection that exist irrespective of the Proposal.

- Waka Kotahi is the agency responsible for this intersection and is understood to be investigating alternative forms of control to address these issues.

- The Proposal is expected to generate new demand for staff travel to and from the site as the result of an increased workforce.

- The timing of staff shifts is such that this demand does not add to existing peaks or cause adverse effects at the intersection.

- The Proposal is not expected to increase heavy traffic volumes through the intersection at peak hours of the day, compared to current and forecast traffic volumes without the Proposal.

[1] This report uses cubic metres (m^3) as the unit of measurement for log volume. This can be taken as interchangeable with the units of tonnes or Japanese Agricultural Standard (JAS) that are used in other parts of the Application.

- Notwithstanding that, a sensitivity test of a 20% increase in peak hour heavy commercial vehicle (HCV) movements has been assessed and can be accommodated by the existing intersection, or either of the potential upgrades being considered by Waka Kotahi, with manageable effects.

- Construction traffic movements are estimated to be of a similar scale to the 20% increase in HCV movements and can be managed in a similar way.

In light of the assessed effects of the Proposal, we recommend the following mitigation measures are incorporated into the construction and operation phases of the Proposal:

- A construction traffic management plan (CTMP) is prepared to detail and manage construction effects as a condition of consent, to be prepared and certified when the contractor is appointed, and the construction methodology is known.
- An operational traffic management plan (OTMP) is prepared to detail and manage operational traffic and parking effects as a condition of consent, to be prepared and certified prior to the completion of construction. This should specifically detail:
    - The provision of at least one accessible parking space for people with disabilities.
    - Supply of at least 14 cycle parking spaces;
    - The overall approach to access, parking, and circulation with the Proposal completed; and
    - Any measures to manage and minimise potential safety and efficiency effects on external transport network (for example requests made of drivers to use/avoid routes).

We also understand that EPL will continue to participate in discussions with Waka Kotahi regarding the timing of Waka Kotahi's upgrade of the SH35/Hirini Street intersection. We support the continuation of those discussions given the intersection is already operating beyond its capacity at peak times.

With the implementation of the above mitigation measures and recognising the ongoing discussions regarding the SH35/Hirini Street intersection, we consider that the construction and operational traffic effects of the Proposal can be managed to be no more than minor.

2 SITE LOCATION

Eastland Port ('the port') is located on Kaiti Beach Road, south of the Gisborne central business district (CBD) and on the opposite side of the Turanganui River. Kaiti Beach Road, Rakaiatane Road and Hirini Street form the primary road connection to Wainui Road, which is part of State Highway 35 (SH35) through Gisborne. The site location is shown as Figure 1.

FIGURE 1 – SITE LOCATION (BASE MAP SOURCE: OPEN STREET MAPS)

Figure 2 below shows that the port area is zoned 'Port A' and 'Port B' by the TRMP. There is also a pocket of 'Heritage Reserve' associated with the Cook Monument, with a Cone of Vision extending south-west into Turanganui-a-Kiwa/Poverty Bay.

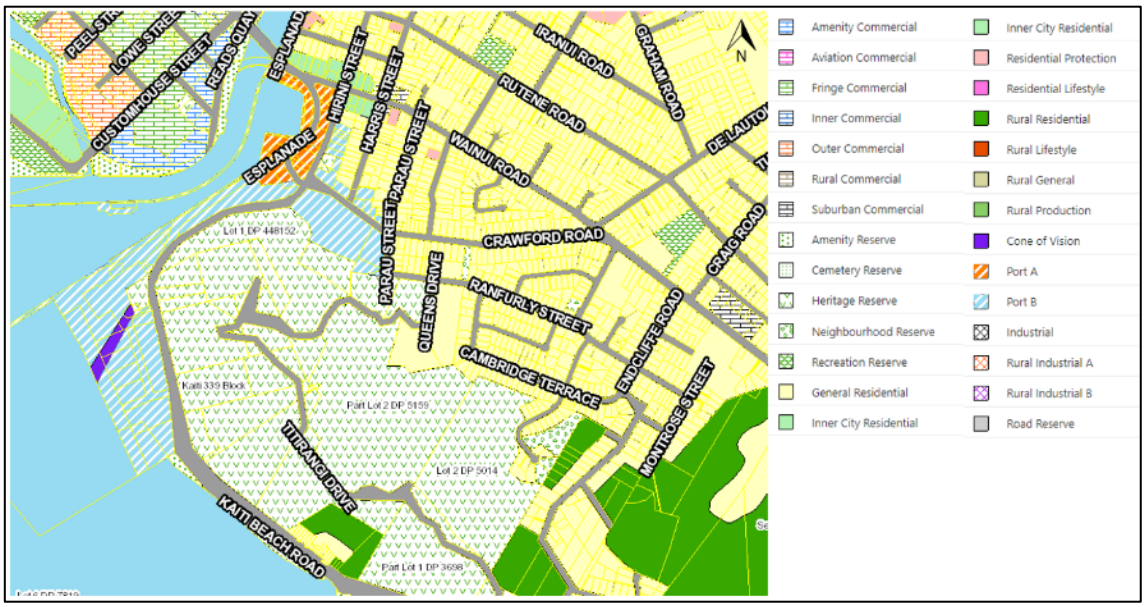


FIGURE 2 – SITE ZONING (MAP SOURCE: TAIRAWHITI MAPS)

3 EXISTING TRANSPORT NETWORK

3.1 Road Hierarchy

The port is linked to the public road network via a continuous road which intersects with Wainui Road (SH35). This road has three different names along its length, Hirini Street, Rakaiatane Road and Kaiti Beach Road (from north to south). Is it classified as an arterial road in the TRMP road hierarchy between Wainui Road (SH35) and the start of the southern log yard, as shown on Figure 3 and Figure 4 below. Beyond this point, Kaiti Beach Road takes on a local road classification.

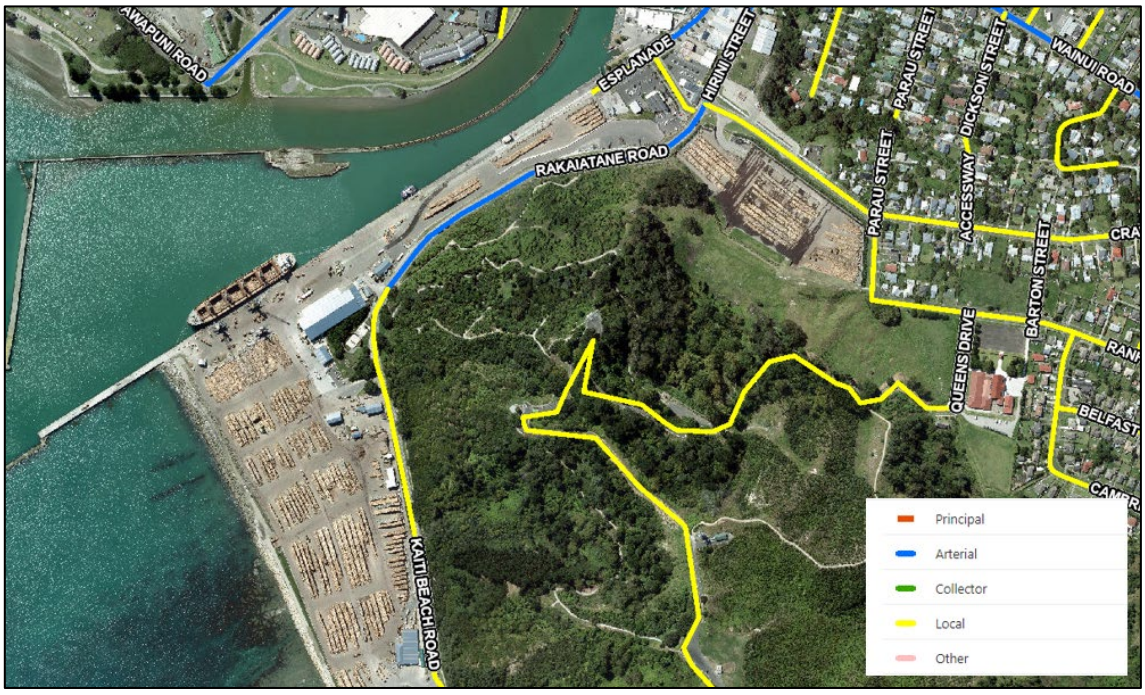


FIGURE 3 – ROAD HIERARCHY (LOCAL CONTEXT) (MAP SOURCE: TAIRAWHITI MAPS)

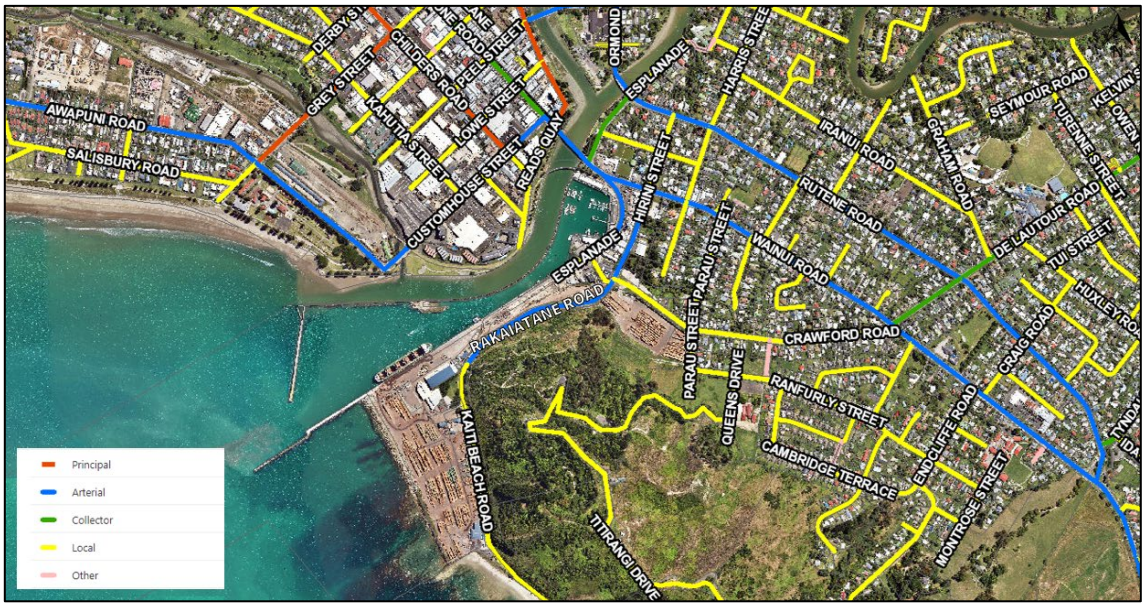


FIGURE 4 – ROAD HIERARCHY (WIDER CONTEXT) (MAP SOURCE: TAIRAWHITI MAPS)

The upper log yard sits on the southern corner of the Rakaiatane Road/Crawford Road intersection and takes access from Crawford Road, which is classified as a local road.

The Esplanade (between Wainui Road (SH35) and Crawford Road) is also classified as an arterial road, primarily providing access to the marina and the commercial areas adjacent to it. It also provides an emergency alternative access to the port.

In the broader Gisborne network, Wainui Road (SH35) and Rutene Road are classified as arterial roads. SH35 provides the primary connection south to SH2 and onto Wairoa and Napier (via Wainui Road (SH35), Customhouse Street and Awapuni Road) and north towards Tolaga Bay.

Rutene Road, Ormond Road and Back Ormond Road provide a non-state highway connection north towards Opotiki and the Bay of Plenty, joining SH2 just south of Ormond. The road hierarchy in a regional context is shown as Figure 5.

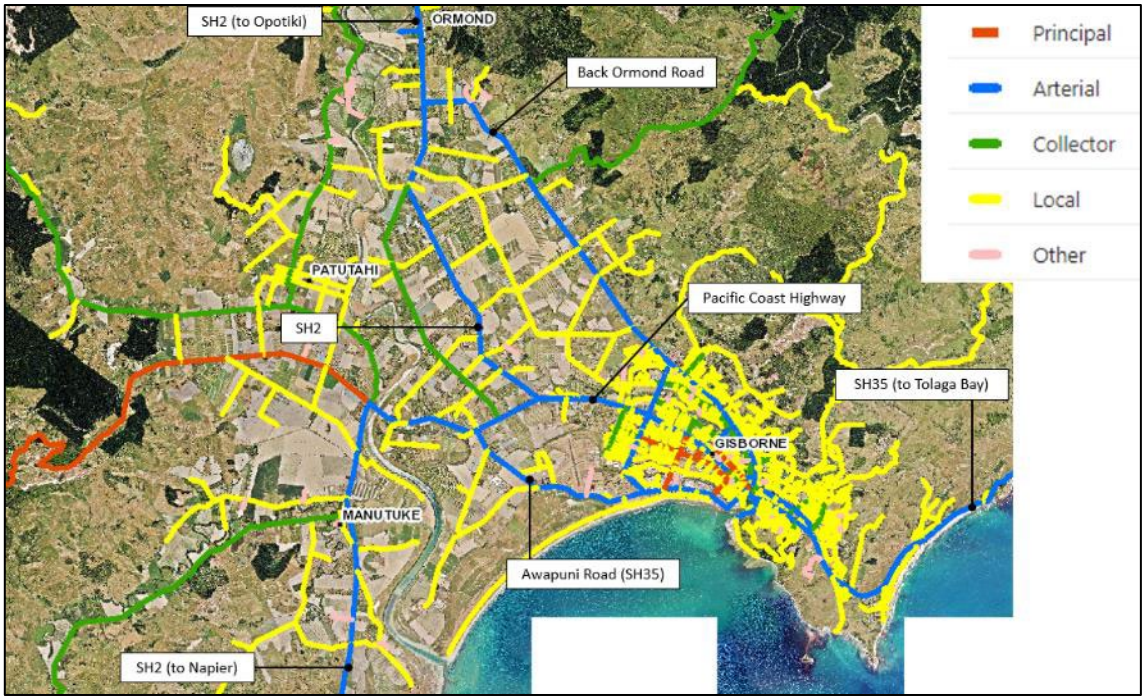


FIGURE 5 – ROAD HIERARCHY (REGIONAL CONTEXT) (MAP SOURCE: TAIRAWHITI MAPS)

These Figures illustrate that the port is well located relative to both the arterial network in Gisborne and the regional State Highway network, which is discussed further in the following section.

3.2 State Highway Network Road Hierarchy

The Gisborne region is served by two State Highways; State Highway 2 (SH2) which generally follows the east coast of the north island from Wellington to Auckland, and State Highway 35 (SH35) which circles the East Cape. Both connect from Gisborne to Opotiki. The location of the port in the context of the State Highway network is shown as Figure 6.

FIGURE 6 – STATE HIGHWAY NETWORK

3.3 Rail Network

Gisborne is linked by a rail corridor to Napier as part of the Palmerston North-Gisborne Line. This line opened in 1942 and became a freight-only line in 2001. The line was closed by KiwiRail in 2012 following several significant washouts north of Wairoa, resulting in major damage to rail infrastructure.

The section between Wairoa and Napier was reopened in 2018 however the Wairoa to Gisborne section remains closed, with no known timeframe for reopening. At this point in time, the port cannot receive freight by rail as there is not enough space for a modern rail head at the port and no current proposal by KiwiRail to connect the port to the existing rail network.

3.4 Existing Network Form

This section of the report describes the existing transport network surrounding the site. This includes the roads that provide access to different areas of the port, and the roads and intersection that connect the port to the State Highway network.

3.4.1 Wainui Road

Near the port, Wainui Road (SH35) has a sealed width of approximately 14m and provides one traffic lane in each direction, separated by a 3m wide central painted median. There are sealed shoulders on both sides with on-street parking permitted on some sections and prohibited on others. The posted speed limit is 50km/h. The existing form of Wainui Road (SH35) in this area is shown as Figure 7. The area around the Wainui Road (SH35)/Esplanade (North) intersection is shown as Figure 8.

FIGURE 7 – WAINUI ROAD (SH35) (MAP SOURCE: TAIRAWHITI MAPS, 2022)

FIGURE 8 – ESPLANADE (NORTH)/SH35 (MAP SOURCE: TAIRAWHITI MAPS, 2022)

There are footpaths on both sides of Wainui Road (SH35) and various cycle facilities in the form of off-road shared paths and on-road cycle lanes.

The intersection of Wainui Road (SH35)/Hirini Street is controlled by a Stop sign, with Wainui Road/SH35 having priority. There are right and left turn bays on Wainui Road (SH35) to support movement of traffic into Hirini Street.

The intersections of Wainui Road (SH35) with Esplanade (south) and Esplanade (north) are also Stop controlled, with right turn bays provided on Wainui Road. The right turn out of Esplanade (North)

onto SH35 was recently permanently removed, making that intersection left out, left in and right in only.

3.4.2 Hirini Street

Hirini Street is approximately 290m long between the Wainui Road (SH35) intersection and the Crawford Road intersection. It has a sealed width of approximately 11-12m and provides one traffic lane in each direction. On-street parking is generally permitted in the shoulders. The posted speed limit is 50km/h.

There is a footpath on the eastern side of the road, north of Crawford Road. This switches to the western (port) side of the road just north of the Crawford Road intersection, where there are steps and a separate ramp provided down to the Esplanade.

The Hirini Street/Crawford Road intersection is controlled by Give Way signs on the Crawford Road approach. The area around this intersection is shown as Figure 9. The access to the upper log yard can be seen on the southern side of Crawford Road. The cycleway crossing (which is a shared pedestrian and cycle crossing) can be seen to the north of the intersection.

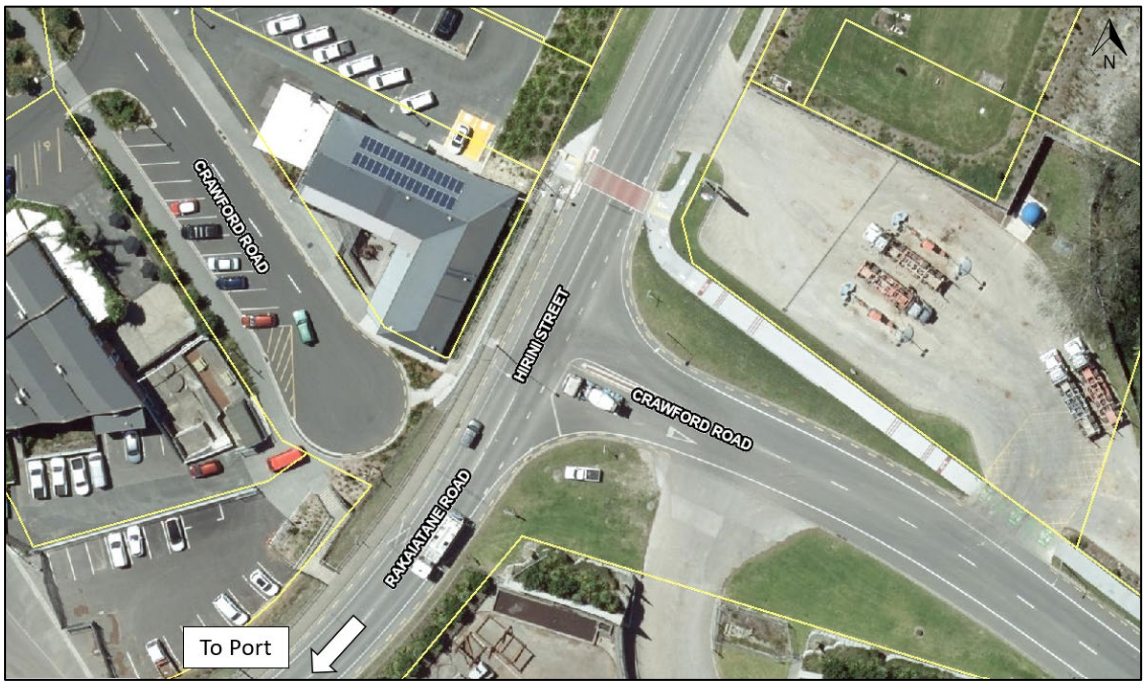


FIGURE 9 – HIRINI STREET (MAP SOURCE: TAIRAWHITI MAPS, 2022)

3.4.3 Rakaiatane Road

From the Crawford Road intersection, Rakaiatane Road is approximately 470m long to the start of Kaiti Beach Road. It has a sealed width of approximately 11m and provides one traffic lane in each direction. On-street parking is prohibited along its length. It provides a wide footpath along the port side of the road and includes a midblock pedestrian crossing to the reserve path on the opposite side.

A view of the Rakaiatane Road just south of the upper log yard is shown below as Figure 10. The underpass between the upper log yard and the wharfside yard is also visible.

FIGURE 10 – RAKAIATANE ROAD (MAP SOURCE: TAIRAWHITI MAPS, 2022)

3.4.4 Kaiti Beach Road

From Rakaiatane Road, Kaiti Beach Road extends nearly 1.4km to its end. Approximately half of this length is bounded by the port with the rest alongside the coast. This section has a sealed width of approximately 11m and provides one traffic lane in each direction. On-street parking is generally prohibited along the port frontage except for defined indented parking bays, one at and a second to the north-of, the Cook monument. The posted speed limit is 50km/h, reinforced by occasional speed humps, and the port gate intersections are controlled by Give Way signs.

The footpath continues on the western side of Kaiti Beach Road as far as the Cook monument. A gravel path (the Tupapa Heritage Trail) emerges from the reserve and runs along the eastern side of the road at approximately this location. A third indented parking bay, approximately 130m long, is provided beside the southern log yard along the port side of the road.

Beyond the southern log yard Kaiti Beach Road provides access to residential dwellings, the foreshore and the Gisborne Yacht Club. A fourth indented parking bay, approximately 100m long, is provided along the western, beach, side. The road reduces in width to approximately 6m and has minimum road markings. Views of Kaiti Beach Road are shown below as Figures 11 and Figure 12.

FIGURE 11 – KAITI BEACH ROAD, GATE 5 (MAP SOURCE: TAIRAWHITI MAPS, 2022)

FIGURE 12 – KAITI BEACH ROAD, GATE 7 (MAP SOURCE: TAIRAWHITI MAPS, 2022)

3.4.5 Crawford Road

Crawford Road meets Hirini Street and Rakaiatane Road at a T-intersection, controlled by Give Way signs on Crawford Road. This end of Crawford Road (the western end) has a sealed width of approximately 12m, made up of two 3.5m wide traffic lanes and sealed shoulders. There is a footpath on the northern side of the road only. The same carriageway layout is maintained as Crawford Road moves east into the residential area.

The upper log yard has a two-way access located approximately 17m from the intersection, on the southern side of the road.

An on-road cycle facility has recently been completed on the northern side of the carriageway. This transitions to an off-road path just before Hirini Street. This area is shown below as Figure 13.

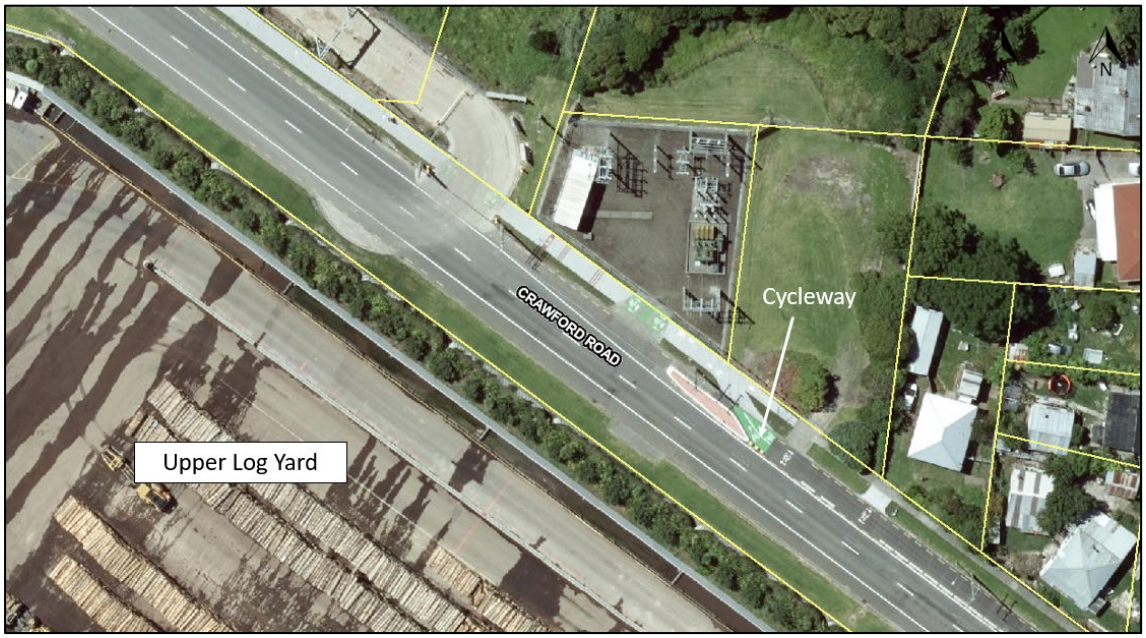


FIGURE 13 – CRAWFORD ROAD (MAP SOURCE: TAIRAWHITI MAPS, 2022)

3.5 Public Transport Network

The 2A (City-Kaiti-Tamarau-City) bus service runs along Wainui Road (SH35) on a loop from Bright Street in the CBD through Waikirikiri and back to Bright Street. There are nine services daily on weekdays and none at the weekend or on public holidays.

The nearest stops to the port (Stops 61 and 62) are located on Wainui Road (SH35) east of Hirini Street. These are approximately 950m or a 10-minute walk from the port office on Kaiti Beach Road.

3.6 Walking and Cycling Network

Waka Kotahi's Urban Cycleways Programme (UCP) has funded various improvements to cycle routes in Gisborne. As shown on Figure 14 below, these routes include the connection between Wainui and the CBD, along SH35, and a route along Crawford Road and Hirini Street.

FIGURE 14 – GISBORNE URBAN CYCLEWAYS (SOURCE: WAKA KOTAHI)

The cycleway along Crawford Road is mostly on-road, switching to off road on the northern side of Crawford Road as it approaches Hirini Street. A pedestrian/cycle crossing is provided across Hirini Street just to the north of the intersection, with asphalt road humps provided to the north and south, to slow vehicles on approach to the crossing. These facilities were shown earlier on Figure 9 and Figure 13.

Near the port, there is a footpath along the western (port) side of Hirini Street from the Cook monument to just north of Crawford Road, where there is a ramp connecting down to Esplanade (North). Just south of Crawford Road, stairs also connect down to Esplanade (North). The footpath is on the eastern side of Hirini Street from Crawford Road to Wainui Road (SH35).

The Kaiti Hill walk can be accessed from Kaiti Beach Road, approximately opposite the Cook Monument. On-street indented parking bays in this area are sometimes used by walkers accessing the track.

4 EXISTING PORT ACTIVITY

4.1 Overview

Eastland Port is New Zealand's second largest log exporter and easternmost commercial port. It is operated by Eastland Group on behalf of its shareholder Trust Tairawhiti. The port primarily handles logs (over 99% of its total throughput). It also moves a small volume of fresh produce and receives cruise ships.

The layout of the port area and the names used for various port areas and facilities are summarised below on Figure 15.

FIGURE 15 – PORT LAYOUT OVERVIEW (BASE MAP SOURCE: GOOGLE EARTH)

The port has three on-site log yards and various facilities to support the handling and processing of logs and other cargo. Trucks access the southern log yard and the Wharfside log yard from Kaiti Beach Road. The upper log yard is accessed from Crawford Road.

There is an underpass for port vehicles (predominately "shuttle trucks") between the upper and wharfside log yards, underneath Rakaiatane Road. EPL also has an off-site log yard at Matawhero. This is located approximately 10km to the west, via Dunstan Road, McDonald Road and SH35. It provides approximately 9.1 ha of log storage. Approximately 22% of the port's overall stocks are typically held at Matawhero.

Eastland Port has reached its log export capacity (of approximately 3.0M m^3 per annum with a single berth[2]. Export capacity is capped by the port's ability to load ships and its daily load rate, which is currently around 10,330 m^3/day on average or 16,135m^3/day at peak. It is also influenced by weather conditions that affect both shipping (ability to move ships in and out of port) and log cartage (ability to move logs from forests to port or off-port storage areas).

4.2 Port Access

The port has various accesses to Crawford Road, Rakaiatane Road and Kaiti Beach Road. These are summarised below on the current EPL Traffic Management Plan (TMP) which is an EPL internal document that is maintained for management purposes.

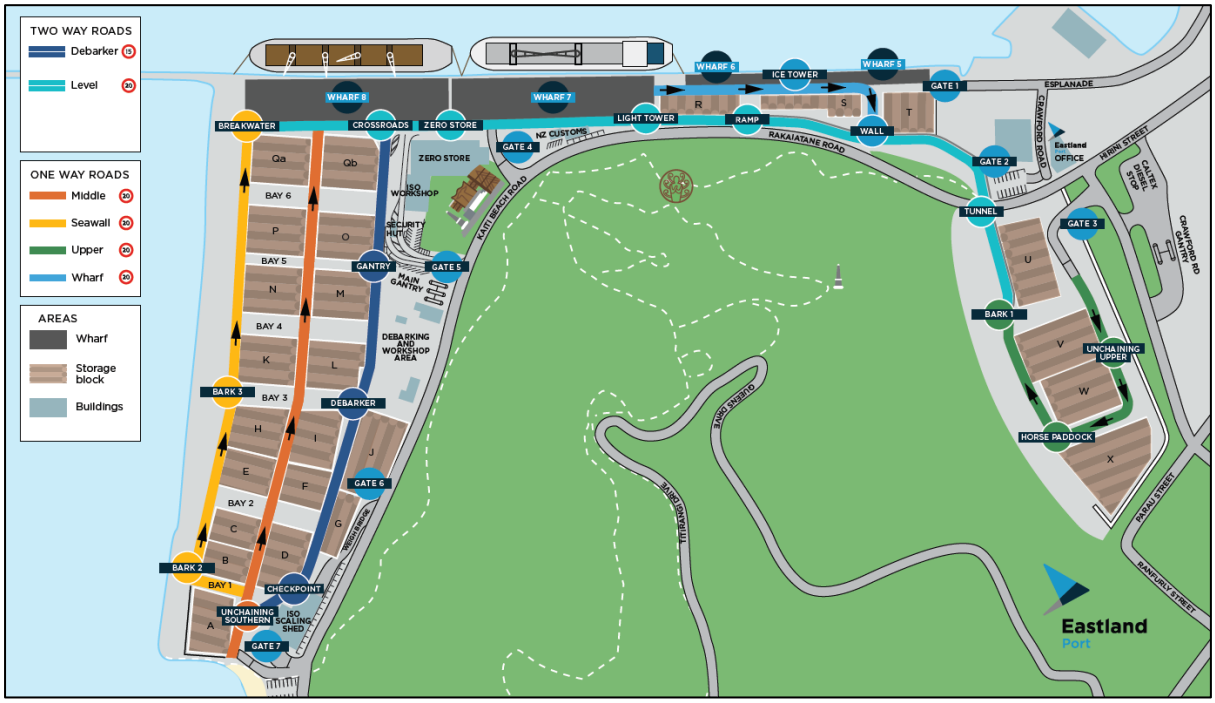


FIGURE 16 – EPL TMP

Aerial views of the areas around each external access point are also shown below as Figures 17, 18 and 19.

[2] Section 2.2, Alternatives Assessment Report, EPL, August 2022

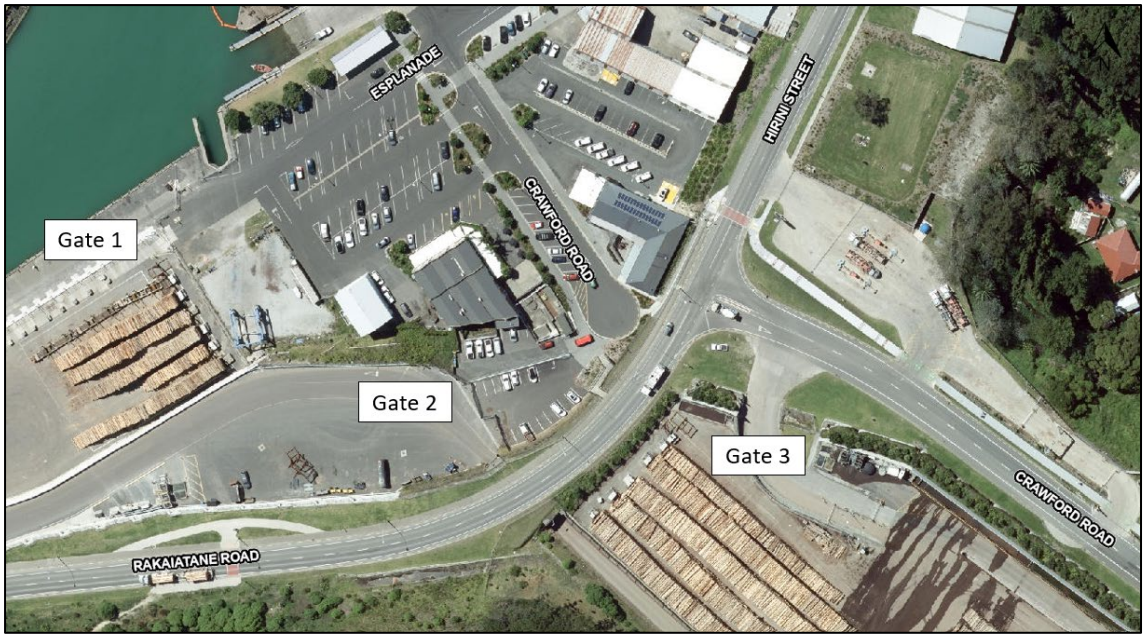


FIGURE 17 – GATES 1, 2 & 3 (MAP SOURCE: TAIRAWHITI MAPS, 2022)

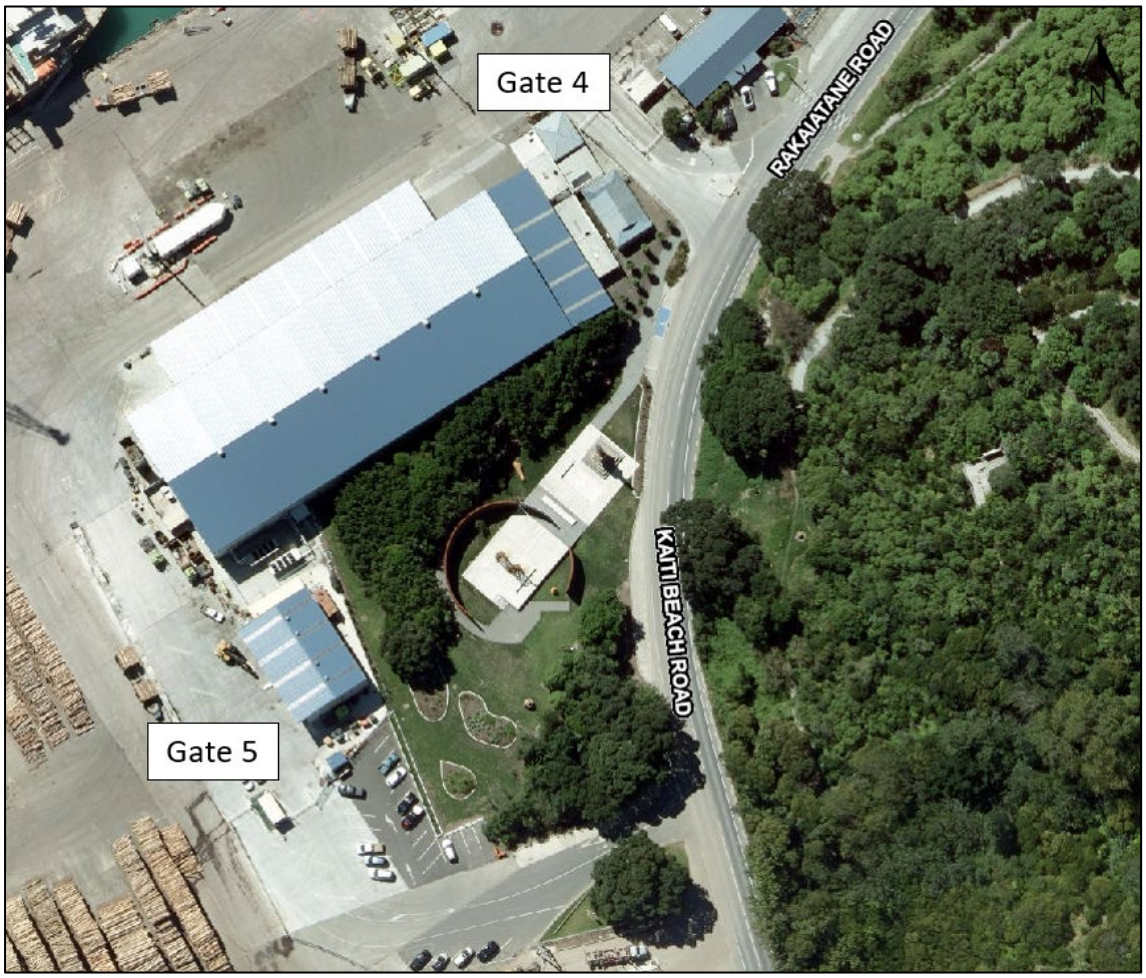


FIGURE 18 – GATES 4 & 5 (MAP SOURCE: TAIRAWHITI MAPS, 2022)

FIGURE 19 – GATES 6 & 7 (MAP SOURCE: TAIRAWHITI MAPS, 2022)

There are two pedestrian gates through which authorised people access the port. These are located at Gate 5 (beside the ISO Workshop) and Gate 7 (beside the scaling shed). The port is a highly controlled environment with very limited pedestrian permeability, for safety reasons.

Irrespective of the Proposal, EPL has been proactively upgrading its carpark areas and the walking and cycling routes that connect to them and the surrounding areas more generally.

Recently completed pedestrian/cycle works include:

- The path on the northern side of Kaiti Beach Road;
- Southern log yard seawall improvements incorporating public access to the seaward side of the Port; and
- Turnstile access at the Main Entrance (Gate 5).

4.3 Daily Port Activity

Daily activity at the port is variable. On any given day, logs are moved by truck from forests to the port, from forests to off-port storage areas, and from those off-port storage areas to port. These operations are managed by different logging companies, who lease different areas of on and off-port storage during different phases of their harvesting and exporting activities.

This variability is illustrated by the following graph which shows daily cart in volumes (logs received at either the port or Matawhero) for the three years leading up to 31 March 2022. The graph also highlights some traffic count and survey days that are referred to later in this report.

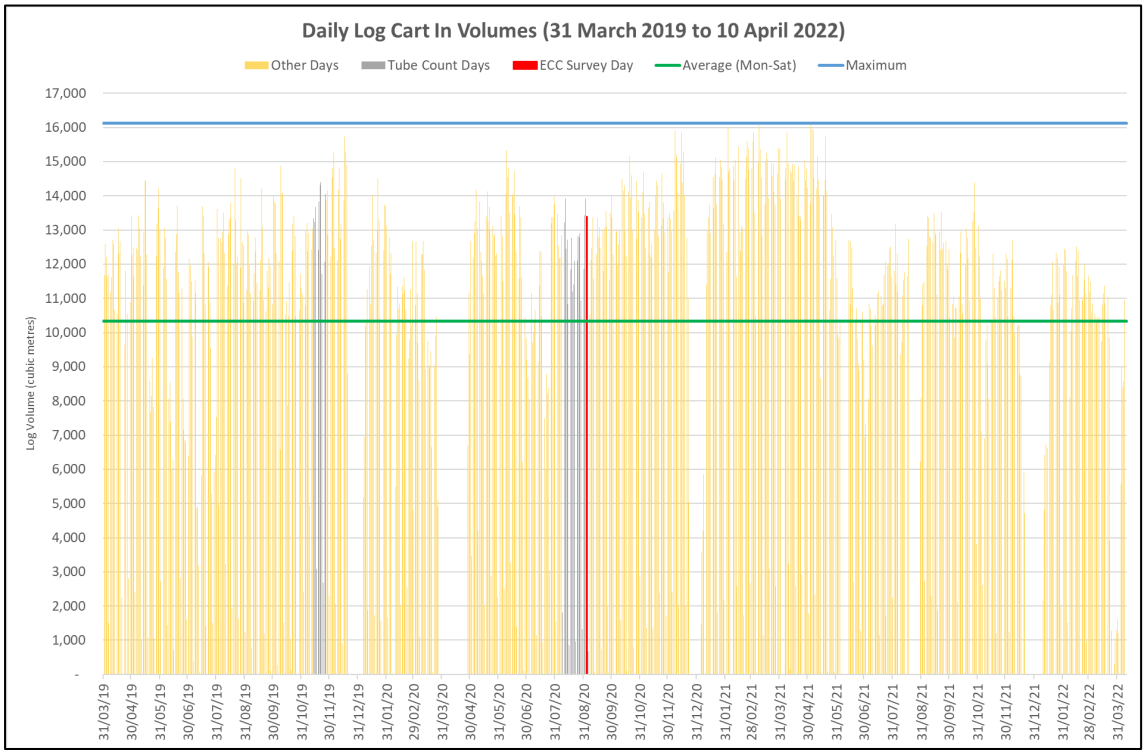


FIGURE 20 – DAILY CART IN VOLUMES 2019-2022

During this period the port received a maximum of 16,135m^3 of logs on any one day and had an average cart in volume of 10,330 m^3 of logs per day[3].

4.4 Hourly Port Activity

Traditionally, the distribution of truck activity across the day at the port involves two peaks. There is a first round of arrivals from the forest between 7am and 9am. Trucks then make a second round-trip and return to the port between 1pm and 3pm. Trucks travelling further may not make the second round-trip within in the day, in which case they deliver the logs the following morning.

This pattern is evident in classified hourly traffic count data collected on Hirini Street, which is described in more detail in Section 5.3 of this report. Figure 21 below shows existing heavy commercial vehicle (HCV) volumes across the day.

[3] Log volumes are recorded as combined totals received at either the port or Matawhero. Although the data is not isolated by site it is suitably indicative of overall activity patterns at both sites.

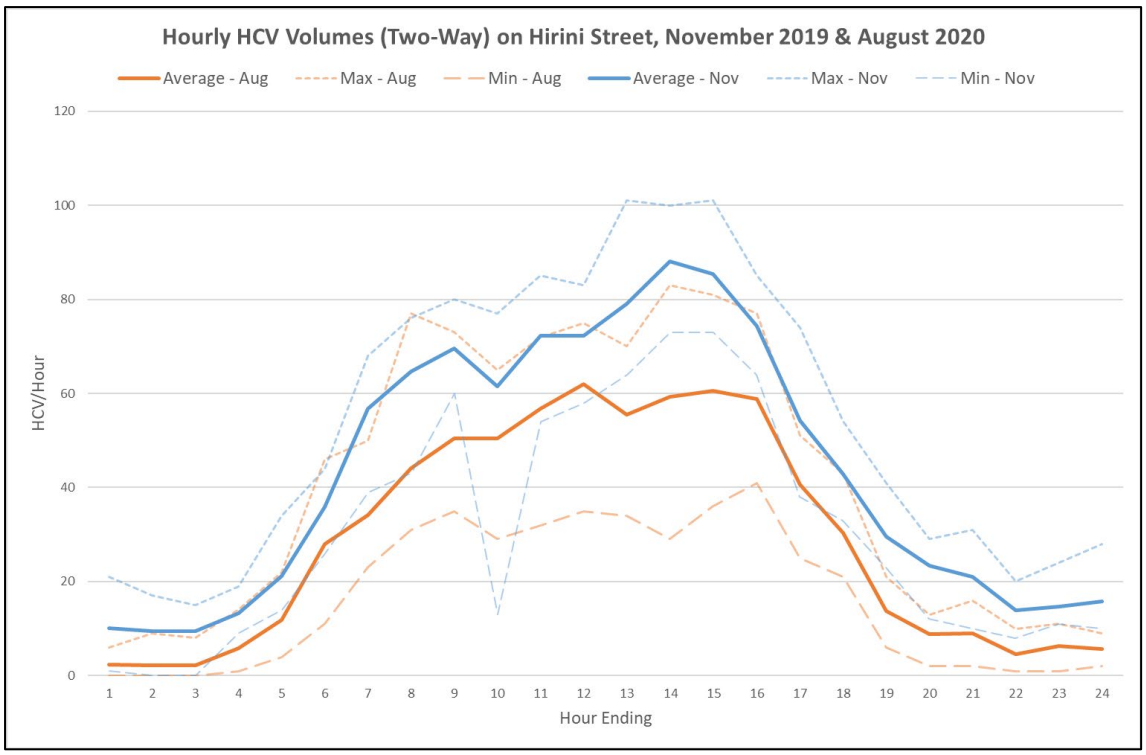


FIGURE 21 – HOURLY HCV VOLUMES, HIRINI STREET

Over time this pattern has flattened as off-port storage areas have been developed. Cartage from off-port storage areas can run more consistently through the day. Travel distances are shorter, more trips can be achieved in the day, and there is a larger stockpile of logs to load from compared to carting directly from forests. This results in flattening of the profile and more activity outside the traditional peaks.

4.5 Staffing

The existing port activity is a 24-hour operation. The EPL management and marine teams (approximately 60 people) are based at the EPL Office at 2 Crawford Road, accessed from the Esplanade. These teams may see some growth over time (10% or so) but are not expected to materially change as a direct result of the Proposal. This assessment has therefore focused on the 'on-port' activities which are accessed via Hirini Street.

Staff numbers vary between weekdays and weekends and increase when a ship is in port. Figures 22, 23, 24 and 25 below summarise the number and type of staff[4] on site over the course of a full day, under these various scenarios. Tabulated data is also presented in Appendix A.

[4] Staff on site are employed by New Zealand Customs, ISO Limited (a port logistics company) or EPL.

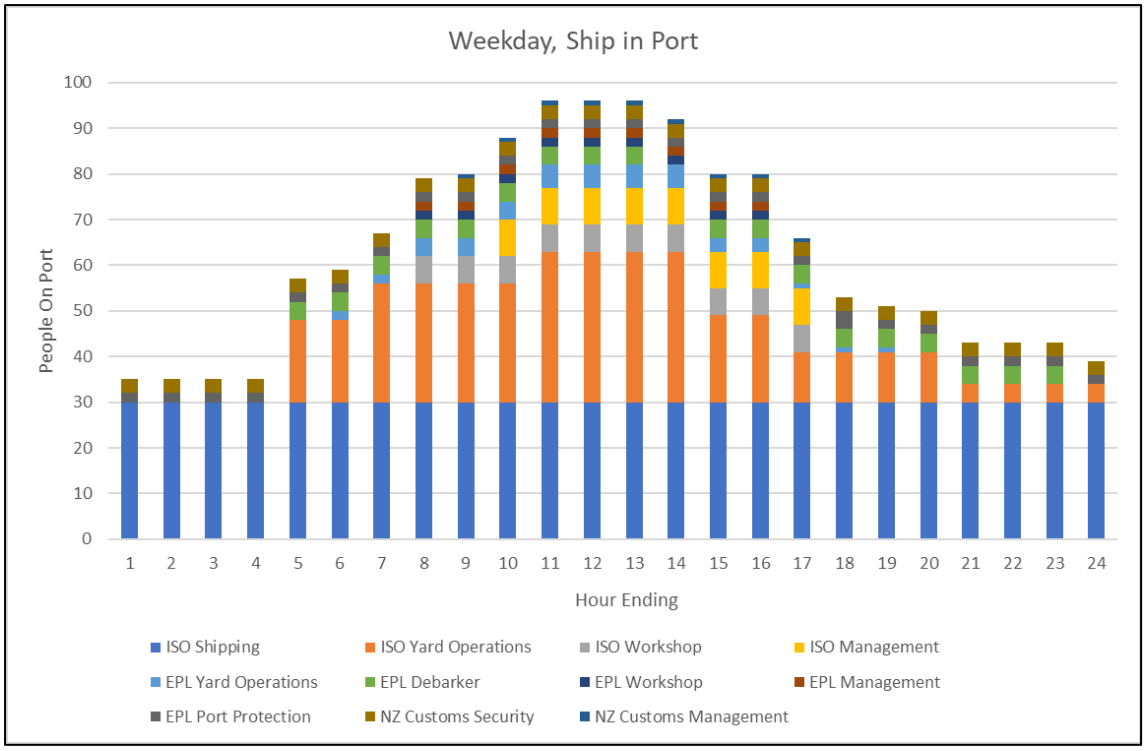


FIGURE 22 – STAFF NUMBERS, WEEKDAY WITH SHIP IN PORT

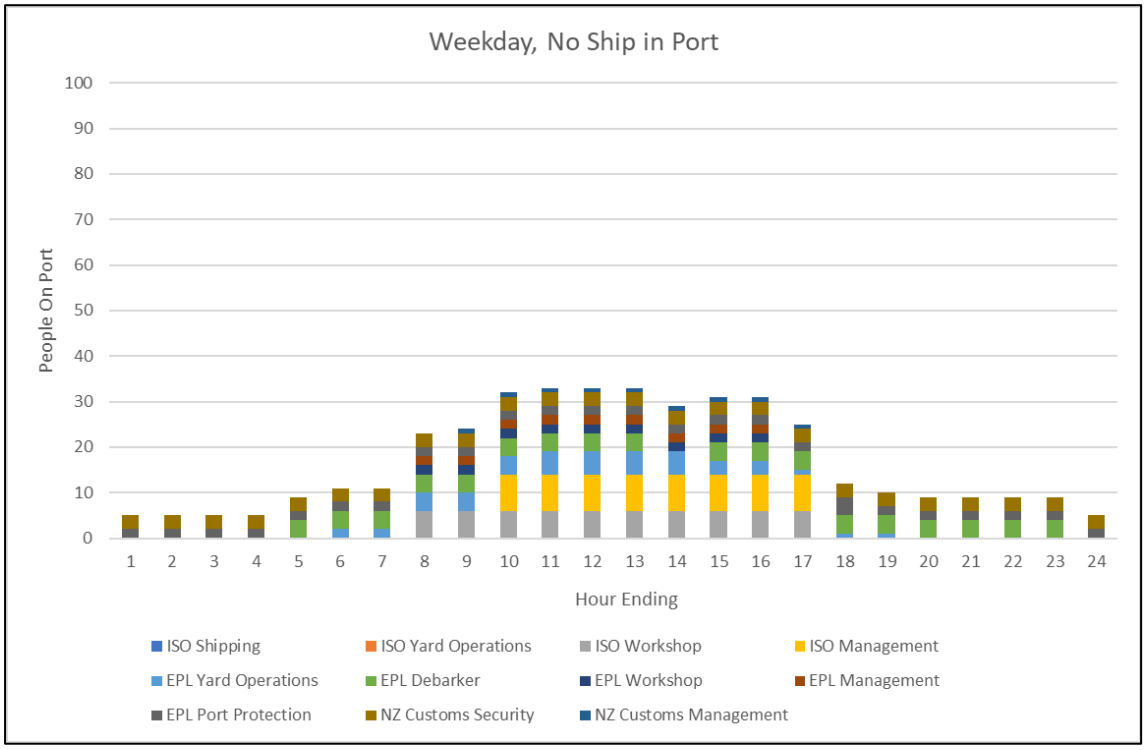


FIGURE 23 – STAFF NUMBERS, WEEKDAY NO SHIP IN PORT

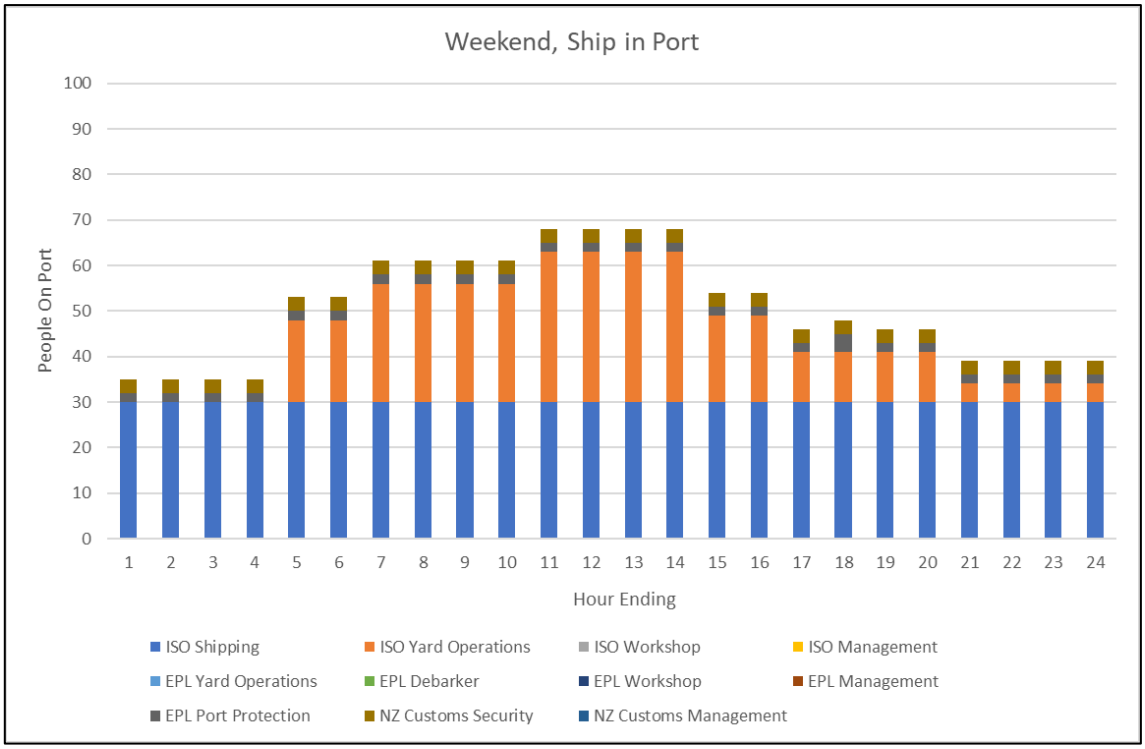


FIGURE 24 – STAFF NUMBERS, WEEKEND WITH SHIP IN PORT

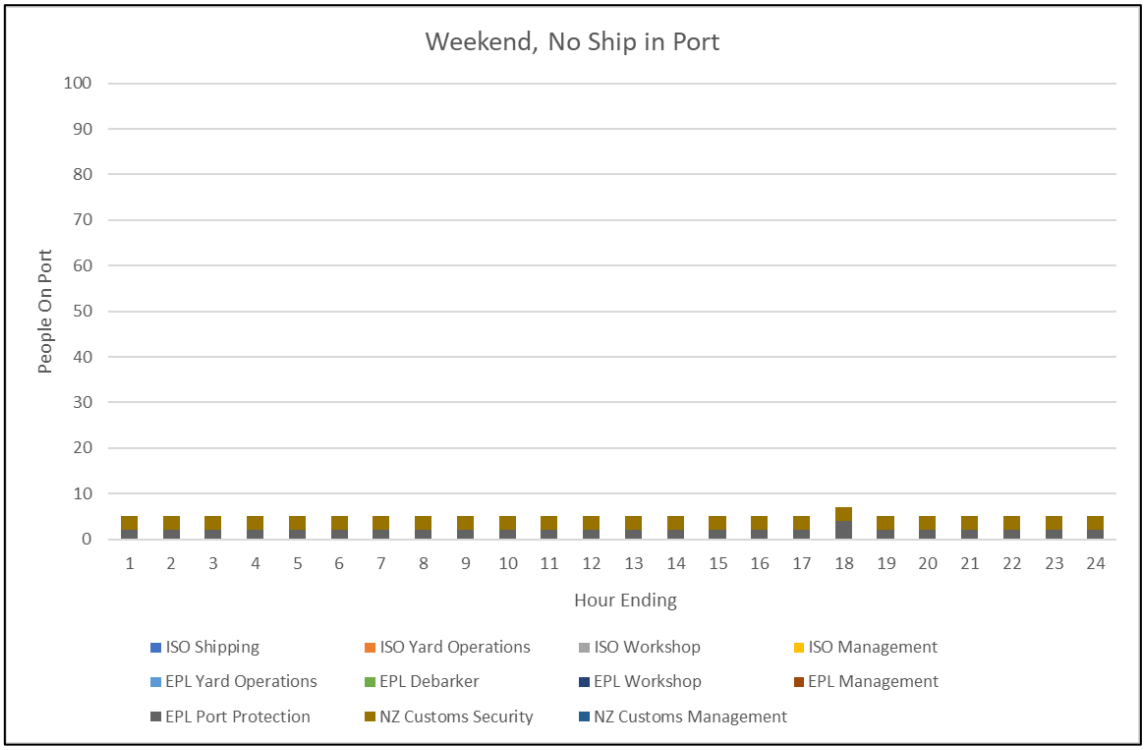
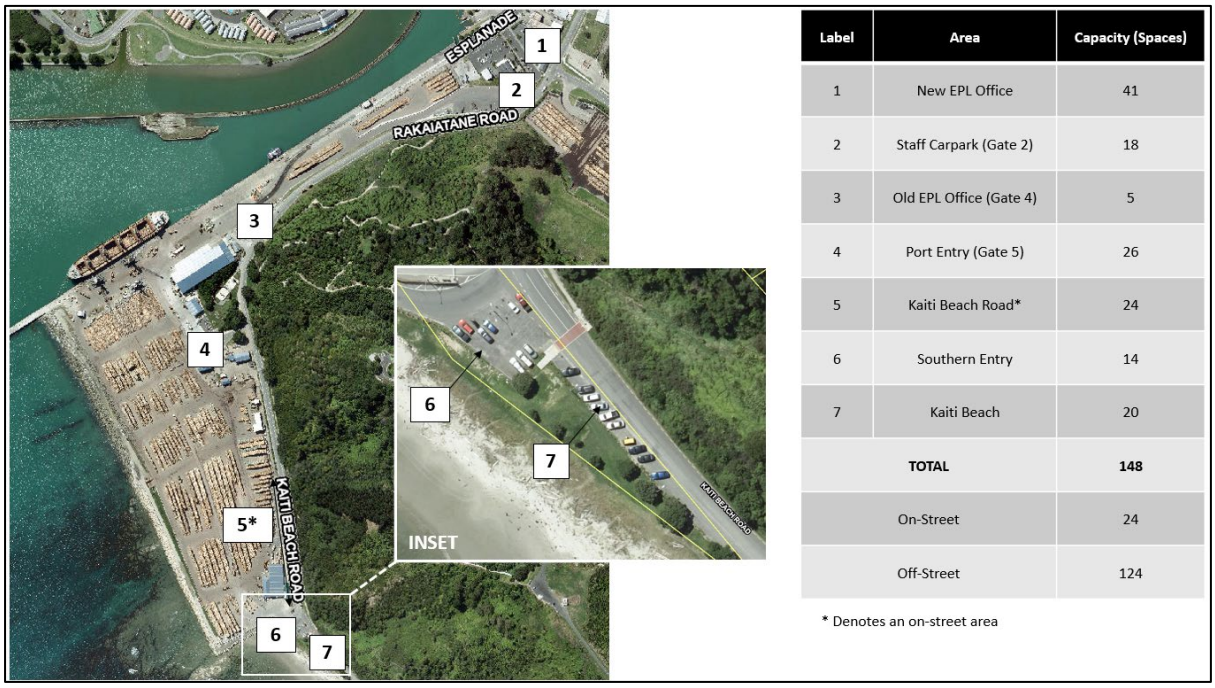


FIGURE 25 – STAFF NUMBERS, WEEKEND NO SHIP IN PORT

4.6 Parking

Parking for port staff is provided in various areas around the port. Locations of parking and approximate capacities are summarised on Figure 26.



Label	Area	Capacity (Spaces)
1	New EPL Office	41
2	Staff Carpark (Gate 2)	18
3	Old EPL Office (Gate 4)	5
4	Port Entry (Gate 5)	26
5	Kaiti Beach Road*	24
6	Southern Entry	14
7	Kaiti Beach	20
TOTAL		**148**
On-Street		24
Off-Street		124

* Denotes an on-street area

FIGURE 26 – EXISTING PARKING AREAS

In total, there are approximately 148 parking spaces available in the areas used by port staff. These are mostly on port land (124 of 148 spaces). The indented parking bay noted as Area 5 is within the road reserve on Kaiti Beach Road.

Other on-street parking areas including those around the Cook monument, and those to the north of Gate 5 which are not used by port staff were excluded from the surveys.

ECC arranged parking occupancy surveys in and around the port on Friday 25 and Saturday 26 February 2022. A ship was in port on both days. The survey results are summarised in Table 1.

Map Ref (Figure 26)	Area	Capacity (Spaces)	Friday 9:00am		Saturday 11:00am	
			Vehicles	% Occupancy	Vehicles	% Occupancy
1	New Office	41	20	49%	15	37%
2	Staff Carpark	18	5	38%	6	33%
3	Old Office	5	3	60%	5	100%
4	Port Entry	26	13	50%	13	50%
5	Kaiti Beach Road	24	9	38%	9	38%
6	Southern Entry	14	12	86%	11	79%
7	Kaiti Beach	20	6	30%	5	25%
-	**TOTAL**	**148**	**68**	**46%**	**64**	**43%**
Unoccupied spaces						
All Areas		-	80	-	84	-
Port Land Only		-	65	-	69	-

TABLE 1 – PARKING OCCUPANCY SURVEY RESULTS

Table 1 shows that total parking demand reached up to 68 vehicles during the Friday survey. At this time there were at least 65 parking spaces that were unoccupied, or 80 if the on-street area on Kaiti Beach Road is also considered.

4.7 Heavy Vehicle Trip Generation

The Hirini Street tube count data presented later in Section 5.3 can be used to estimate the existing HCV movements associated with the port. Whilst Hirini Street is a public road and there could be non-port related heavy vehicle movements included in the count, these are not expected to be significant in volume.

On this basis, during the two counted weeks in November 2019, the port generated an average of 1,030 HCV/day. During the four counted weeks in August 2020 the port generated an average of 704 HCV/day.

Cart in volumes during these weeks were in the range of 10,800 to 13,900m^3. Considering that the port can receive up to 16,135 m^3 per day, these periods represent the port operating at between 78% and 83% of its capacity[5].

The observed daily and peak hour HCV volumes have been factored using these relative tonnages, to reflect an average and peak level. On this basis, the port's current operational traffic levels in terms of average and peak heavy vehicle movements on Hirini Street are as summarised in Table 2.

Scenario	Daily Volume (HCV/Day)	Peak Hour Volume (HCV/Hour)
Surveyed Range	460-1,175	43-101
Current Operational Average Day	800	70
Current Operational Peak Day	1,250	105

TABLE 2 – PORT HCV VOLUME SUMMARY (CURRENT OPERATIONS)

[5] Average cart in volume was approximately 13,300m^3/day during the November 2019 surveys and 12,950 m^3/day during the August 2020 surveys. Peak capacity was 16,135 m^3/day (February 2021).

5 EXISTING TRAFFIC NETWORK VOLUMES

5.1 State Highway Network

Figure 27 below summarises average annual daily traffic volumes (AADT) at State Highway count sites in and around Gisborne. The Figure also shows the volume of heavy commercial vehicles (HCVs) at each count site. Traffic volumes are taken from the latest available dataset (2020) published by Waka Kotahi[6].

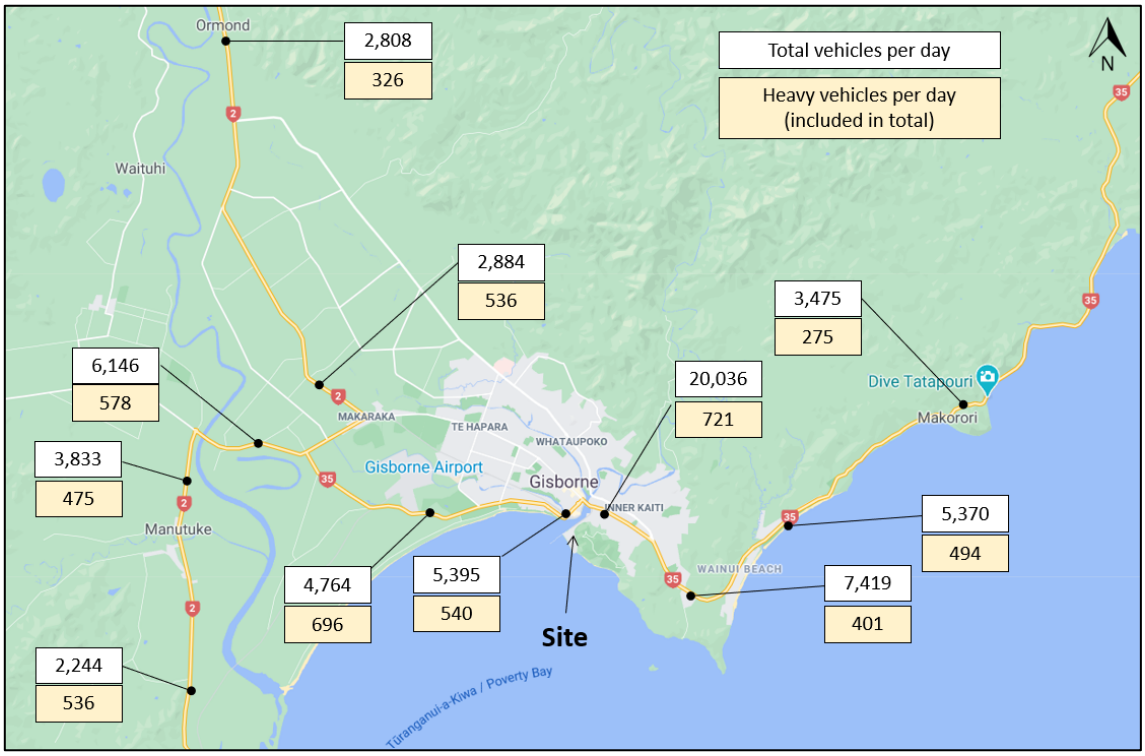


FIGURE 27 – STATE HIGHWAY VOLUMES (BASE MAP SOURCE: GOOGLE MAPS)

It is noted that these are annualised average volumes and as such, should be compared against the port's average operational level (800 HCV/day from Table 2).

The State Highway network in rural areas is generally lightly trafficked, with volumes of between 2,000 and 4,000 vehicles per day (vpd). Volumes increase closer to the urban areas of Gisborne and the site nearest the port (ID:03500327 South of Harris Street) reaches up to 20,036 vpd. This reflects the dual role the state highway network performs in the city, providing for both inter-regional movement and shorter commutes within the city.

Heavy vehicle volumes range from 326-721 vpd around the network and are highest in urban areas.

Review of the historic count data (between 2016 and 2020) shows linear growth rates on these highways that range from 0.1% to 5.3% per annum (pa). The average growth rate is 2.9% pa and the growth rate on the site closest to the port is substantially lower at 0.5% pa.

[6] 'SHTV-2016-2020-all-regions.xlsx', sourced from https://www.nzta.govt.nz/resources/state-highway-traffic-volumes/

5.2 Local Road Traffic Volumes

Figure 28 summarises daily traffic volumes on various Council roads around the port, sourced from the Mobileroad website (which relies on volumes from Council databases). The Gisborne dataset was last updated in June 2022.

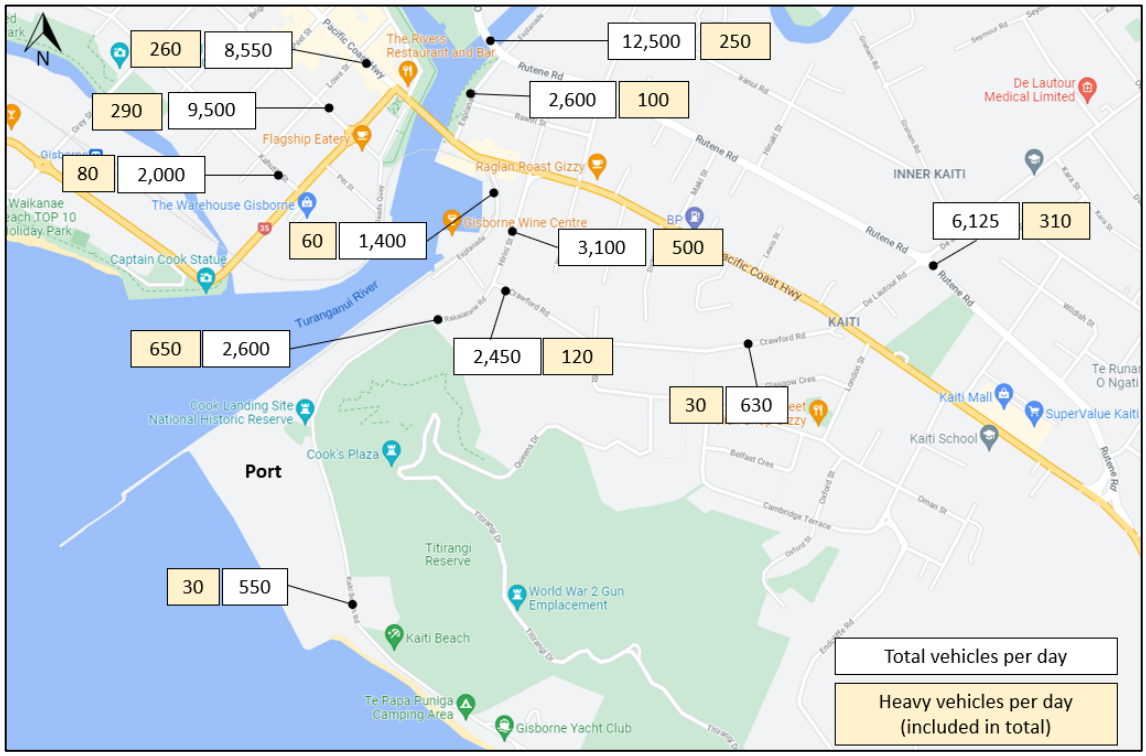


FIGURE 28 – COUNCIL ROAD VOLUMES (BASE MAP SOURCE: GOOGLE MAPS)

Volumes around the port are recorded as 2,450 – 3,100 vpd, falling away to the south on Kaiti Beach Road and to the east on Crawford Road. Rutene Road carries some 12,500 vpd, indicative of its importance as an arterial road parallel to SH35. Roads in the CBD typically carry less than 10,000 vpd.

5.3 Hirini Street Tube Count Data

Hirini Street (north of Crawford Road) was counted for a continuous two-week period in November 2019 (November 13th to 26th) and a four-week period in August 2020 (10 August to 4 September).

There have been no major changes to the transport network in Gisborne since 2019/2020 that would impact the relevance of these counts.

These counts showed average weekday traffic volumes of 5,000-5,300 vpd and weekend volumes of 2,800-3,500 vpd. The hourly distribution of these volumes over typical weekday and weekend (averaged over the two survey periods) is shown below as Figure 29 This graph includes all vehicle types.

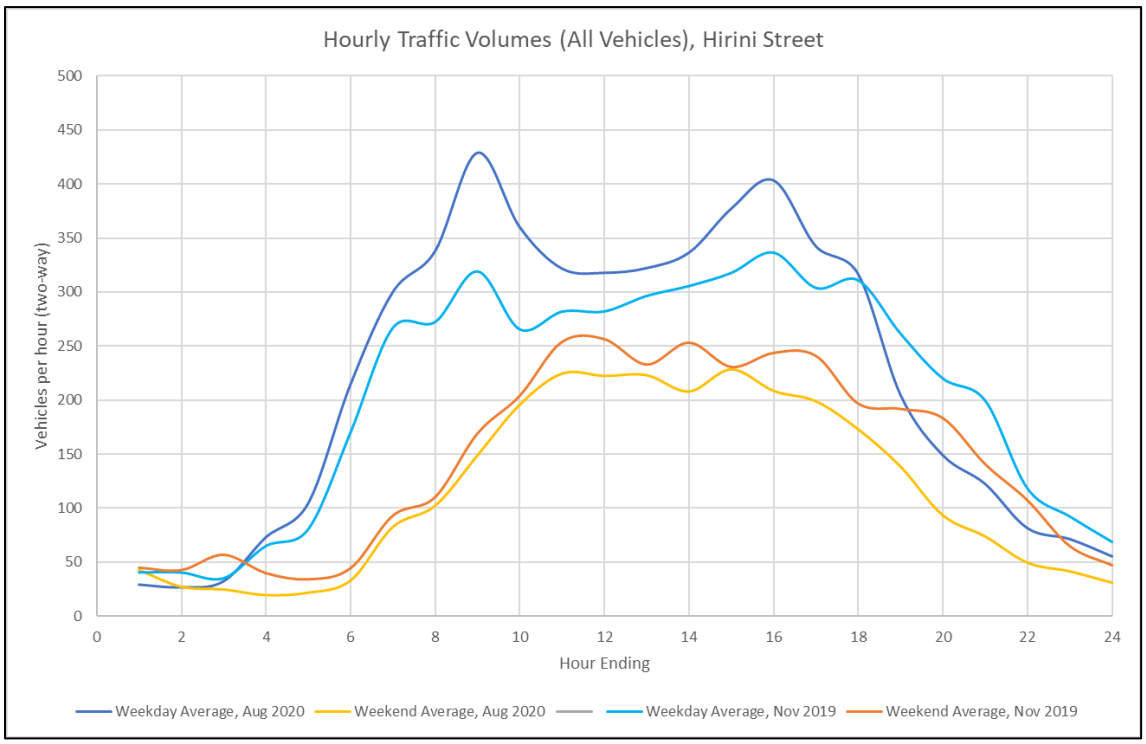


FIGURE 29 – HOURLY TRAFFIC PATTERNS ON HIRINI STREET

This graph shows that:

- A weekday morning peak of up to 430 vpd during the hour ending 9am.
- A weekday evening peak of 400 vph during the hour ending 4pm; and
- A flatter profile on weekends with a single and broader peak of around 250 vph during the middle part of the day.

Heavy vehicles accounted for between 13% and 21% of the total daily volumes counted in August 2020 and November 2019, respectively. Daily HCV volumes ranged from 460 HCV/day to 1,175 HCV/day. On average, the HCV volume was 703 HCV/day in August and 1,030 vpd in November.

Figure 30 presents the weekday pattern again and separates this into light and heavy vehicles. The HCV pattern is also shown at a smaller scale on Figure 31.

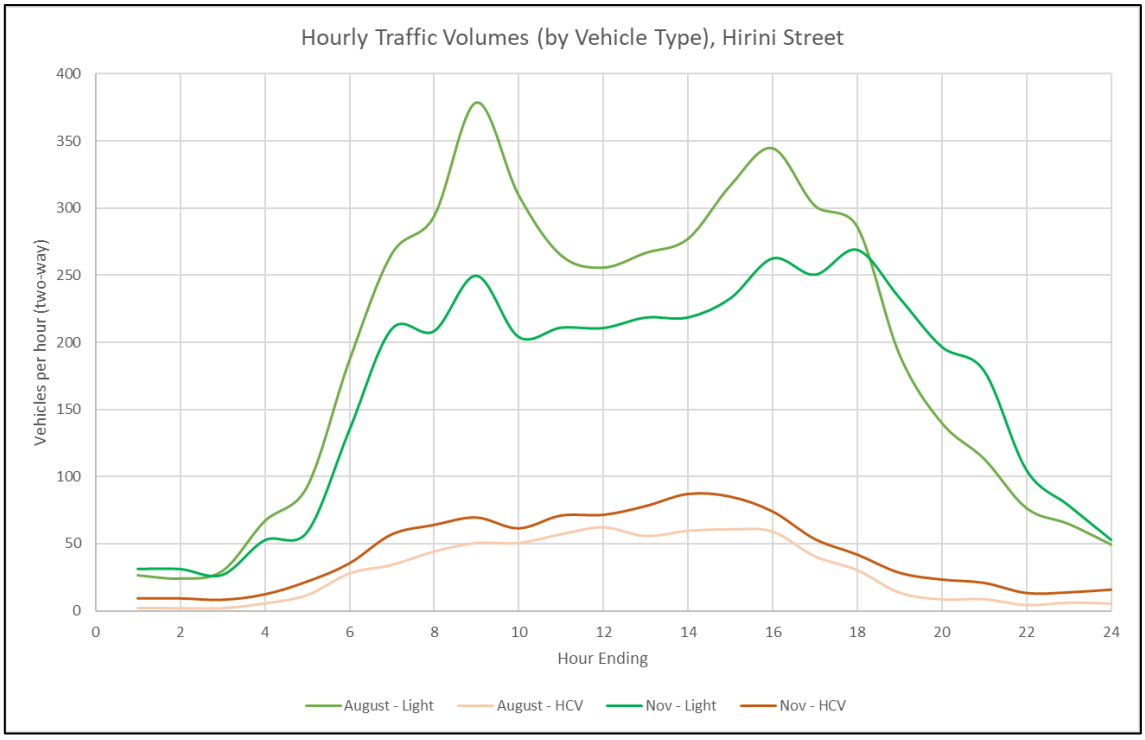


FIGURE 30 – HOURLY TRAFFIC PATTERNS ON HIRINI STREET, BY VEHICLE TYPE

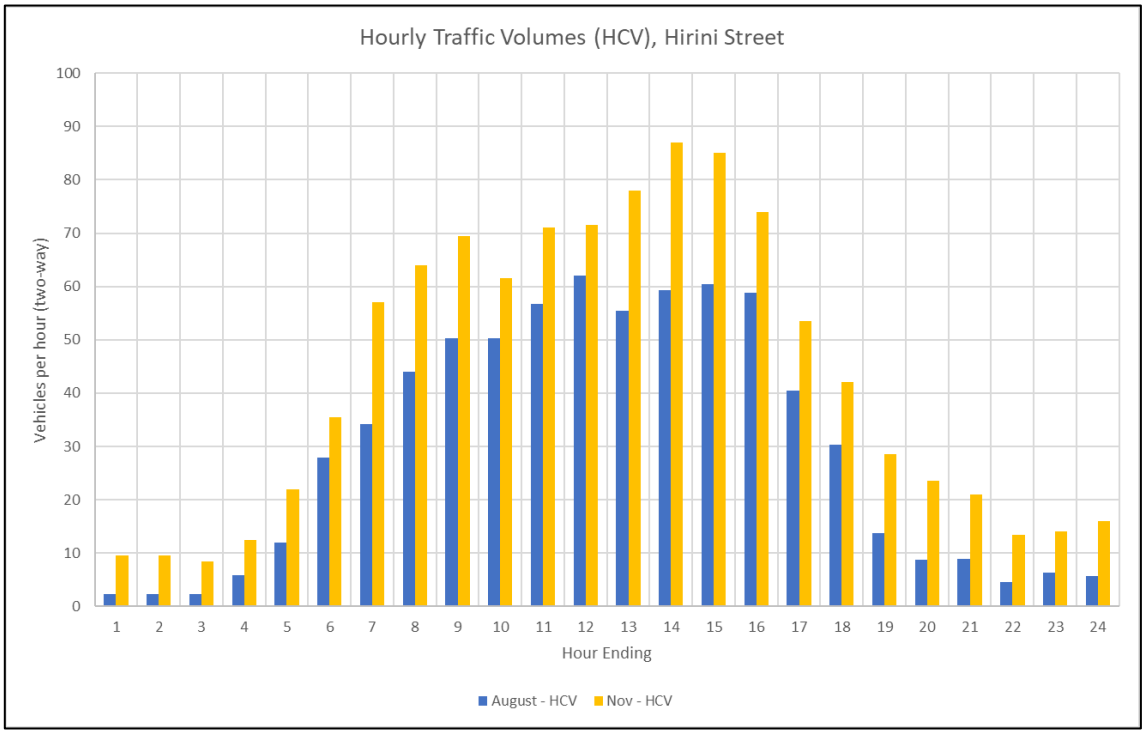


FIGURE 31 – HOURLY HCV PATTERNS ON HIRINI STREET

These graphs show that:

- The movement of light vehicles along Hirini Street (from the port and other activities) produces the peaks in the morning and afternoon;

- HCV activity has a flatter profile with the two periods (more obvious in November) between 7-9am and 1-3pm; and
- HCV volumes reach 70-87 HCV/day in the early afternoon.

During these counted periods, the port was operating at between 78% and 83% of its capacity[7]. Adjusted peak and average volume estimates were presented earlier in Table 2.

5.4 Intersection Count Data

5.4.1 Survey Day

Guided by the timing of the peak periods in the November counts, classified intersection turning movement surveys were carried out at the following intersections during September 2020:

- Hirini Street/Crawford Road;
- SH35/Hirini Street; and
- SH35/Esplanade (North).

The surveys covered the periods 6am to 9am and 12pm to 6pm on Thursday 3 September, and 10am to 12pm on Saturday 5 September.

The critical intersection in terms of volumes and performance is SH35/Hirini Street on a weekday. The morning (AM) and evening (PM) peak period counts at this intersection are shown as Figure 32 and Figure 33, respectively. An inter-peak hour (12:00pm to 1pm), when volumes are lower, is also presented as Figure 34 and will be used for comparative purposes later in the assessment.

[7] Average cart in volume was approximately 13,300 m^3/day during the November 2019 surveys and 12,950 m^3/day during the August 2020 surveys. Peak capacity is taken to be 16,135 m^3/day as recorded in February 2021.

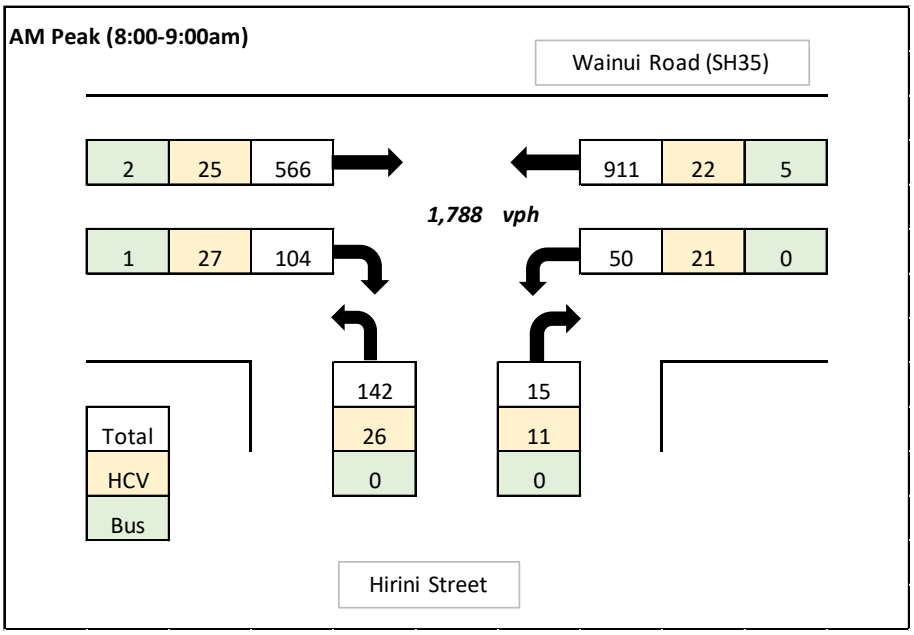


FIGURE 32 – SURVEYED SH35/HIRINI STREET INTERSECTION VOLUMES, AM PEAK

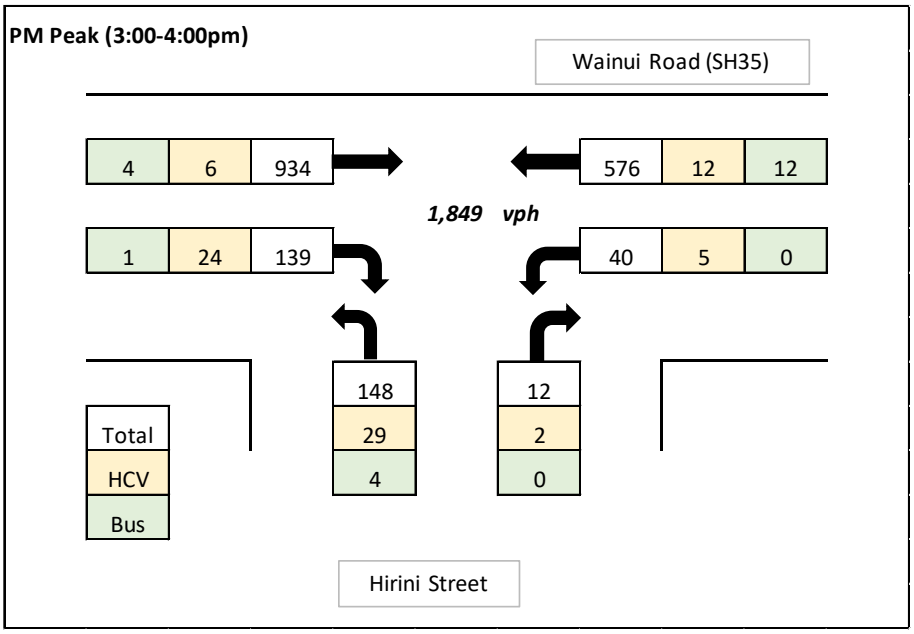


FIGURE 33 – SURVEYED SH35/HIRINI STREET INTERSECTION VOLUMES, PM PEAK

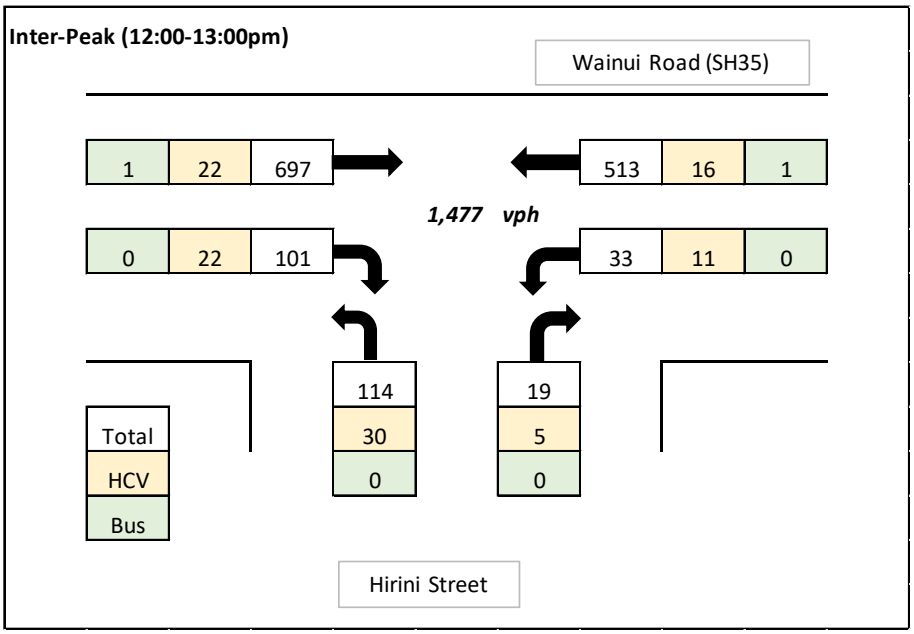


FIGURE 34 – SURVEYED SH35/HIRINI STREET INTERSECTION VOLUMES, INTER-PEAK (IP)

Appendix B presents confirmation that the survey periods were not materially affected by New Zealand's Covid19 response during 2020.

5.4.2 Adjusted Current Base Volumes

The surveyed intersection turning movement counts above were factored to represent an annual average for a base year of 2022. This involved:

- Factoring the surveyed volumes by 1.04 to represent an annual average[8] for the year 2020: and
- Factoring the through movements along Wainui Road (SH35) by 1.037 to allow for background growth between 2020 and 2022.

A factor of 1.20 was also applied to the HCV volumes turning in and out of Hirini Street. This is based on data provided by EPL which shows that on the survey day, the port was operating at approximately 83% of the level it can (and does) operate at in its existing form[9].

With these factors applied, the existing volumes at the intersection become those shown below.

[8] Using Waka Kotahi Research Report 453 (RR453) Table B2 Weekly design factors based on SH seasonal traffic patterns. Group 2 Sites, Week 35.

[9] Based on the ratio between survey day cart in volume (13,395 m^3) versus recent maximum of 16,135m^3 recorded on 4 May 2021.

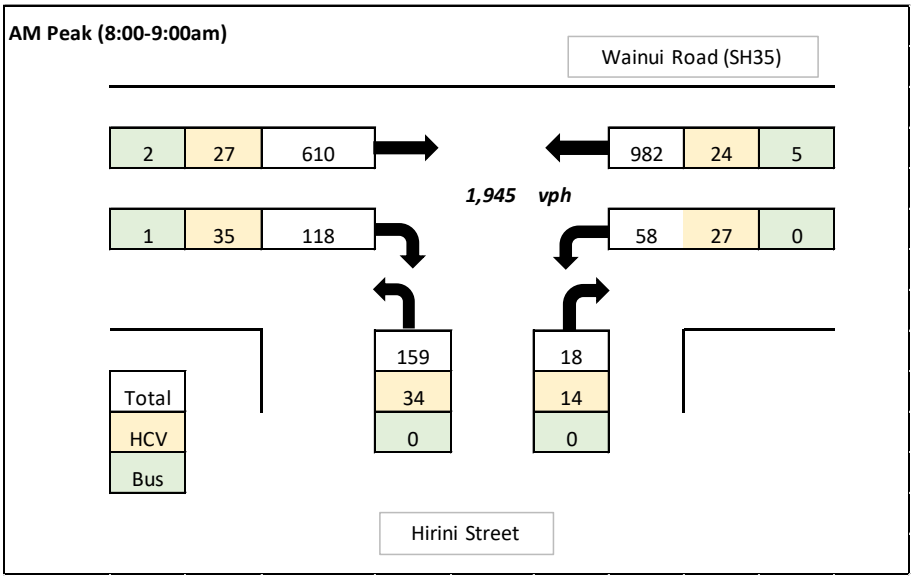


FIGURE 35 – BASE SH35/HIRINI STREET INTERSECTION VOLUMES (CURRENT OPERATIONS), AM PEAK

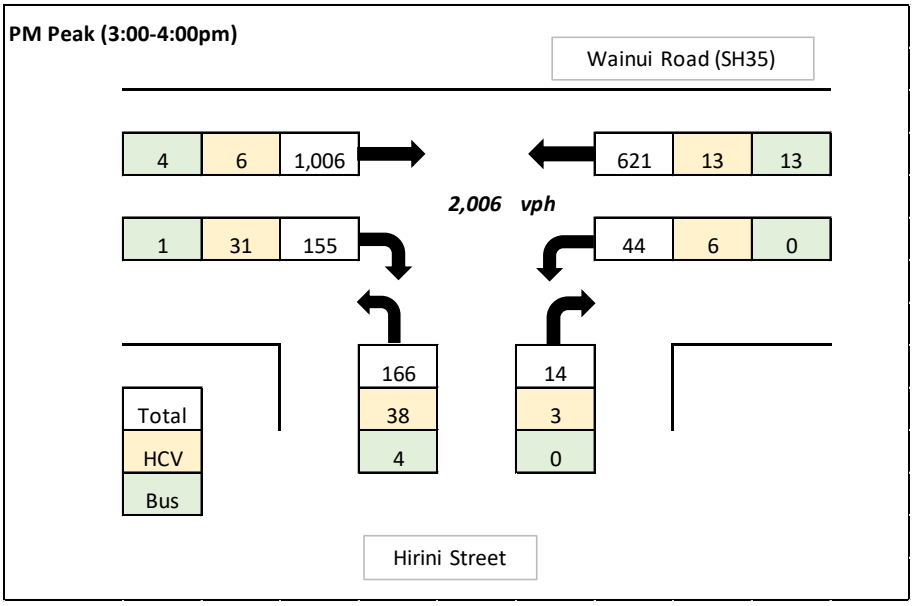


FIGURE 36 –BASE SH35/HIRINI STREET INTERSECTION VOLUMES (CURRENT OPERATIONS), PM PEAK

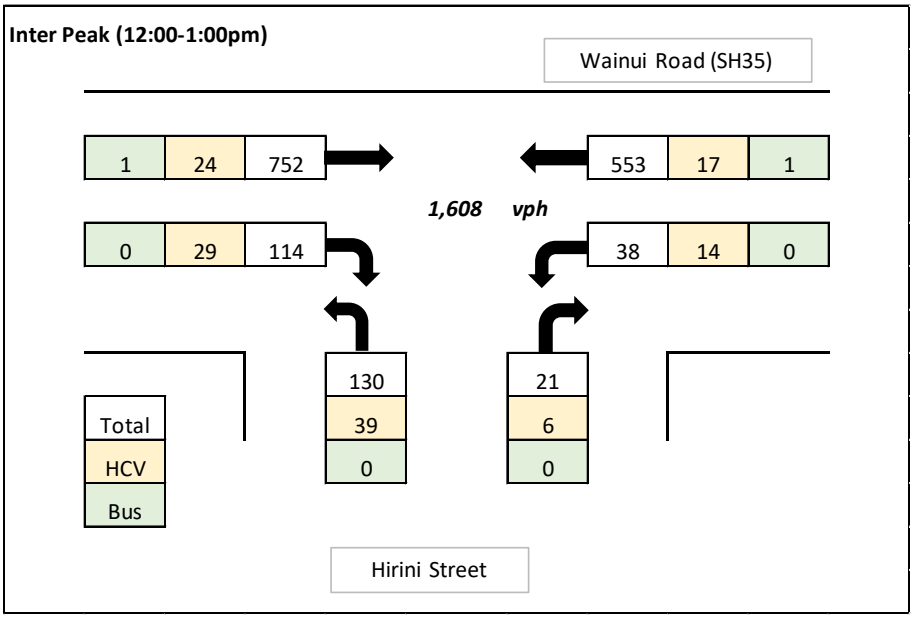


FIGURE 37 –BASE SH35/HIRINI STREET INTERSECTION VOLUMES (CURRENT OPERATIONS), INTER-PEAK

6 PERFORMANCE OF THE EXISTING TRAFFIC NETWORK

6.1 Road Safety

The Waka Kotahi crash analysis system (CAS) was used to review the road safety history of the area around the port and its connection to the State Highway network. The search covered the five-year period 2017 to 2021 inclusive, and any available data from 2022.

The search captured all reported crashes in the area covering:

- The full lengths of Hirini Street, Rakaiatane Road, and Kaiti Beach Road;
- The SH35/Esplanade (South) and SH35/Hirini Street intersections, and the mid-block between them;
- The Hirini Street/Crawford Road intersection; and
- 100m of Crawford Road along the frontage of the upper log yard.

A total of 25 crashes were reported, including two that caused serious injuries and one that caused minor injury. Four of the 25 reported crashes involved HCVs. Full CAS outputs are included as Appendix C.

Crashes that occurred at intersections are summarised in Table 3. This Table also presents actual and expected injury crash rates. The expected rate is calculated using the general crash prediction models from the Waka Kotahi Crash Estimation Compendium (2018). The prediction models consider the type of intersection and the volumes carried by each road.

Intersection	Reported Crashes				Annual Injury Crash Rate	
	Fatal	Serious	Minor	Non-Injury	Actual	Expected
SH35/Hirini Street	-	-	4	6	0.8	0.45
SH35/Esplanade (South)	-	1	-	1	0.2	0.10
Crawford Road/Hirini Street	-	-	2	1	0.4	0.43

TABLE 3 – INTERSECTION CRASH SUMMARY

The SH35/Hirini Street and SH35/Esplanade intersections are experiencing injury crashes at a higher rate than is predicted by the models. The Crawford Road/Hirini Street intersection has a rate that is close to the typical rate for comparable intersections.

Based on the intersection counts described at Section 5.4, HCVs make up between 4% and 7% of the peak hour volumes at the SH35/Hirini Street intersection. No HCVs were listed as being involved in any of the 10 crashes reported at the intersection in the last five years.

Crashes that occurred on midblock road sections (between intersections) are summarised in Table 4. Those crashes (either intersection or midblock) that involved HCVs[10] or an access point to the port are discussed under Table 4.

[10] One single-vehicle crash involving a truck that was transporting a house along SH35 near the Hirini Street intersection has been excluded as it is not a truck associated with the port activity.

Location	Reported Crashes			
	Fatal	Serious	Minor	Non-Injury
Wainui Road (SH35)	-	-	-	2
Hirini Street	-	1	-	2
Rakaiatane Road	-	-	-	1
Crawford Road	-	-	-	1
Kaiti Beach Road	-	-	2	1

TABLE 4 – MIDBLOCK CRASH SUMMARY

Crashes that involved HCVs and/or access points to the port are summarised as follows:

- A non-injury crash (ID: 201969737, June 2019) involving a logging truck colliding with an excavator working under temporary traffic management as it left the southern log yard. The driver of the truck did not stop. The crash was attributed to inattention.
- A non-injury crash (ID: 2018101132, December 2018) involving a logging truck losing control turning right into Crawford Road (December 2018). The crash was attributed to excessive speed.
- A minor injury crash (ID: 201714173, May 2017) involving a logging truck turning right into Crawford Road. The driver gave way to cyclists who were turning into Crawford Road from the north. After following them into Crawford Road the driver had to take evasive action when the cyclists turned back towards Hirini Street. The cab of the truck and the logs rolled (May 2017).

Overall, the crash history indicates that the SH35/Hirini Street intersection is performing worse than expected for an intersection of its layout and volumes. The common crash types and factors at this intersection include impairment due to alcohol or drugs, failure to notice slowed or stopped traffic in front, and loss of control. These crash types are typical of intersections in busy urban areas.

The crash history on roads that serve the port and the port's direct access points does not indicate any underlying issues with the existing provisions for port traffic.

6.2 Existing SH35/Hirini Street Intersection Performance

The surveyed traffic volumes and the current operational base traffic movements (shown earlier as Figure 32 to Figure 37) were modelled in the isolated intersection analysis package SIDRA 9. Results for both scenarios (and all scenarios tested on the existing intersection layout) are included as Appendix D. The following analysis refers to results from the modelling of the current operational base volumes.

The operation of the intersection was also observed during site visits in August 2020 and June 2022. These observations were used to confirm appropriate representation of the intersection in the model.

The results are summarised in Table 5 using the following key performance indicators:

- Average delay for the right and left turns out of Hirini Street (seconds/vehicle);

- 95th percentile queue length for these right and left turns (metres); and
- Critical movement Level of Service (LOS).

'LOS' is a framework for qualitatively summarising a quantitative assessment of the performance of a transport system. Turning movements, approaches and the intersection as a whole are given LOS A, B, C, D, E, or F based on the amount of time each vehicle has to wait to make a movement or pass through an approach or intersection.

Generally, in urban networks LOS D or LOS E is taken as the upper limit of acceptable operation during peak periods. At LOS E, the movement, approach, or intersection is operating at or near its capacity and effects such as long queues may be evident.

LOS F indicates that a movement, approach leg or intersection is congested, and demand exceeds capacity. At priority intersections, LOS is determined by the performance of the worst turning movement[11]. At roundabouts and signals the overall average delay is used. LOS thresholds used in SIDRA are presented as Appendix G.

Parameter	AM Peak	PM Peak	Inter-Peak
Hirini Street Right Turn Delay (s/vehicle)	421	73	38
Hirini Street Right Turn Queue (m)	38	6	5
Hirini Street Left Turn Delay (s/vehicle)	135	20	17
Hirini Street Left Turn Queue (m)	104	18	12
Worst Movement LOS	**F**	**F**	**E**

TABLE 5 – MODELLED BASE INTERSECTION PERFORMANCE (CURRENT OPERATIONS)

The analysis shows that the intersection is operating beyond its capacity in the AM and PM peaks. During the inter-peak, when volumes are lower, the intersection operates with LOS E, meaning it is operating at the upper limit of acceptable operation.

During the AM peak, drivers who turn right are modelled as waiting nearly seven minutes on average. During the PM peak the average is 73 seconds/vehicle. The modelled 95th percentile queue lengths on Hirini Street reach up to 135m (equivalent to approximately 22 standard car lengths or six truck and trailer units). The queue statistics reflect the low proportion of drivers who try to make right turns (less than 10% of drivers leaving Hirini Street).

A comparison of modelled operation and the surveyed volumes (Appendix D) shows broad consistency with what was observed during the site visit, albeit with the full extent of the theoretical delays not eventuating because drivers changed their behaviour in response to the conditions. This is typical of priority-controlled intersections with poor levels of service. As drivers tend to respond with behaviours including:

- Taking smaller gaps in the major road traffic flow;
- Avoiding the more difficult turns (or the intersection altogether); and
- Informally reversing the priority of the intersection, for example when drivers on the major road allow a minor road vehicle to cross of enter in front of them.

[11] Major road delays (in this case SH35) are not used for LOS purposes as these movements are unopposed.

All these behaviours were observed to some extent during the site visit. Notably, on occasions when a truck was waiting to turn right out of Hirini Street it was common for cars on SH35 to create a gap for them and wave them across.

The intersection analysis, combined with the 24-hour traffic volume data that is available for Hirini Street and SH35, can be used to approximate how the intersection is performing across a typical weekday.

Figure 38 below shows an estimated hourly pattern of movement through the intersection. This is taken from the intersection count data and supplemented with the 24-hour patterns on Hirini Street and SH35 (which follow consistent patterns). The LOS data in Table 5 can be used to approximate zones in which the intersection is operating within or over its capacity.

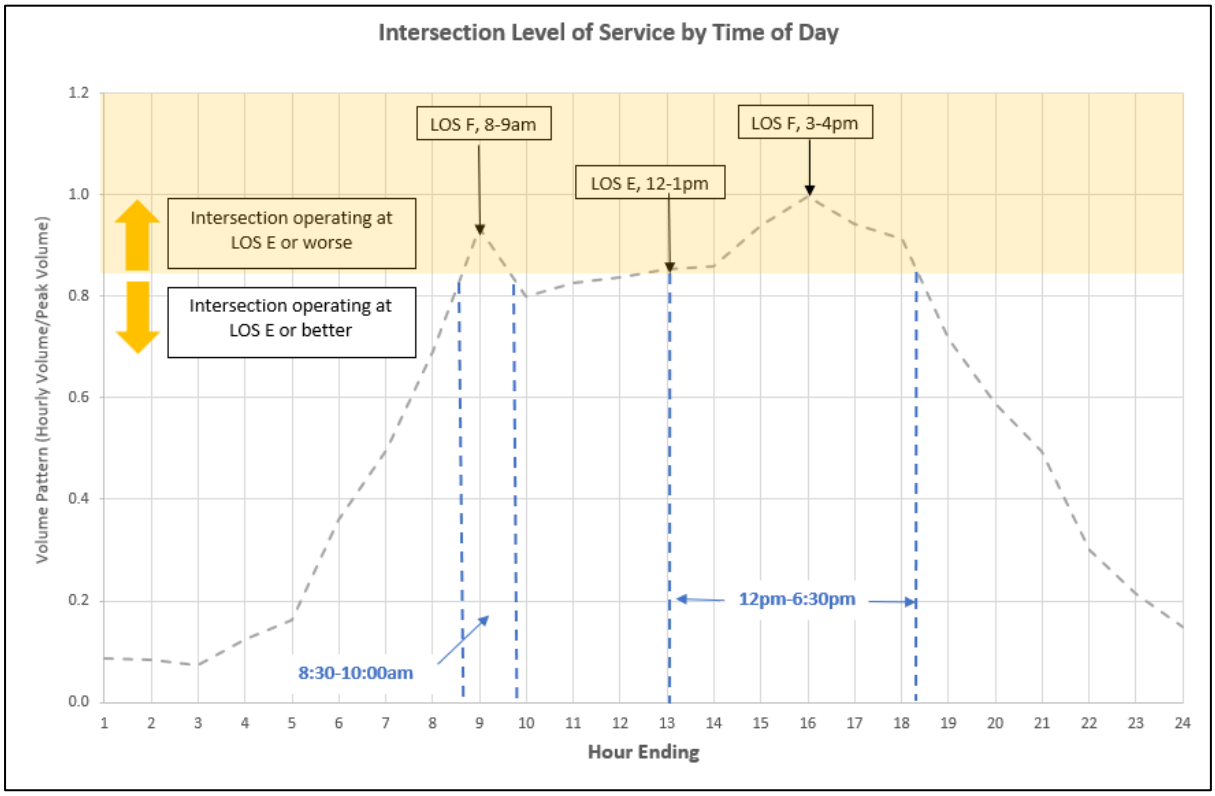


FIGURE 38– ESTIMATED HOURLY INTERSECTION PERFORMANCE

The graph shows that the intersection is expected to be operating at LOS E or worse for around 1.5 hours in the morning (8:30am-10:00am) and 6.5 hours in the afternoon (12pm to 6:30pm). At other times (between 6.30pm and 8:30am and 10:00am to 12:00pm), when volumes are lower, the intersection would be operating with spare capacity and LOS E or better.

As noted below, the SH35/Hirini Street intersection is currently a recognised issue in Gisborne. It is the fourth ranked project in the Te Tairāwhiti Regional Land Transport Plan, behind two projects ranked first equal and one each ranked second and third[12]. Two of the higher ranked projects were funded in the National Land Transport Programme (2021-2024), suggesting that the SH35/Hirini Street intersection project is one of the three highest priority projects in line for the next round of Waka Kotahi funding.

[12] Taruheru Rver Walking and Cycling and Campion to Makaraka Cycleway (first equal), Tairawhiti Walking and Cycling Network (second), and SH2 Inter-regional connections (Waioeka Gorge) (third).

6.3 Existing Link Capacity

The capacity of the wider transport network in and around Gisborne has been assessed by converting the daily volumes shown earlier on Figure 27 and Figure 28 (and some sites more remote from the port) into peak hour estimates and comparing these against road capacity.

This analysis makes the following standard traffic assessment assumptions and typical characteristics of urban areas:

- Peak hour volumes account for 10% of the daily volume;
- Heavy commercial vehicles (HCVs) are converted to passenger car equivalent units (PCUs) using a factor of 4;
- The peak directional flow on any section of road is 60% of the two-way volumes; and
- The theoretical capacity of a traffic lane (rural or urban) is 900 PCUs/hour each way.

Use of the 900 PCU/lane/hour threshold is conservative as urban traffic lanes in particular can typically accommodate in the range of 900-1,400 PCU/lane depending on site specific conditions and features such the presence of driveways and side roads, and intersection capacity.

Figure 39 below shows estimated volume to capacity ratios for selected roads around the port, on the State Highway network, and on the arterial network within Gisborne.

Site	NZTA ID	Location	AADT (vpd)	PCU/Day	PCU/Hour	PCU/Hour/ Lane	Volume/ Capacity Ratio
State Highway Sites	ID:00200428	ORMOND : Telemetry Site 26	2,808	3,785	379	227	25%
	ID:00200441	Carringtons Culvert	2,884	4,493	449	270	30%
	ID:00200444	200 m Nth of Bell Rd	6,146	7,879	788	473	53%
	ID:00200448	Sth end of Whatatuna Bridge	3,833	5,259	526	316	35%
	ID:00200452	Traffic Count Station 15	2,244	3,853	385	231	26%
	ID:03500318	Gisborne: Okitu Reserve	3,475	4,299	430	258	29%
	ID:03500321	HAMANATUA BRIDGE - Telemetry Site 108 WIM	5,370	6,852	685	411	46%
	ID:03500324	Gisborne City Boundary	7,419	8,621	862	517	57%
	ID:03500327	Sth of Harris St	20,036	22,200	2,220	1,332	148%
	ID:03500328	Awapuni Rd 200m east of Grey St intersection	5,395	7,014	701	421	47%
	ID:03500332	170 m Nth of Runway Lighting Towers -LHS	4,764	6,851	685	411	46%
Gisborne District Council Sites	-	Rutene Road, east of Esplanade	12,500	13,250	1,325	795	88%
	-	Rutene Road, east of DeLatour	6,125	7,044	704	423	47%
	-	Ormond Road, east of Lytton Road	8,500	9,265	927	556	62%
	-	Back Ormond Road, east of SH2	1,950	2,594	259	156	17%
	-	Hirini Street, South of SH35	3,100	4,588	459	275	31%
	-	Crawford Road, east of Hirini Street	2,450	2,818	282	169	19%
	-	Crawford Road, west of Wainui Road (SH35)	630	687	69	41	5%
	-	Pacific Coast Highway, west of SH35	8,550	9,320	932	559	62%
	-	Rakaiatane Road, south of Crawford Road	2,600	4,550	455	273	30%

FIGURE 39 – LINK CAPACITY ASSESSMENT (EXISTING)

Figure 39 illustrates that two of the sites (Rutene Road east of Esplanade and SH35 South of Harris Street) are operating at more than 70% of their theoretical capacity. Other than in these two locations, the network is operating well within its capacity.

7 FUTURE TRANSPORT NETWORK

There are a number of planned or anticipated changes to the existing transport network which are at various stages of planning and which are likely to be operational or being implemented within the timescale of the Proposal. These are summarised below.

7.1 Regional Land Transport Plan

Te Tairāwhiti Regional Land Transport Plan (RLTP) 2021-2031 sets out the current state of the transport network, the challenges it faces, and the priorities for future investment. It is jointly prepared by representatives of Gisborne District Council (GDC) and Waka Kotahi.

The RLTP recognises population growth, COVID-19, increasing freight demands, climate resilience and financial constraints as challenges facing the Gisborne region's transport system. The RLTP is structured to invest in safety, resilience, access, economic performance, and environmental outcomes.

Of specific relevance to the present Proposal, the RLTP includes a State Highway Improvement project at the SH35/Hirini Street intersection. This inclusion recognises the performance issues currently experienced at the intersection as discussed above as Section 6.2.

This project is ranked fourth in terms of regional importance (RLTP Table 3), following the Taruheru River and Makaraka Cycle way projects (first equal), a region-wide walking and cycling network plan (second), and improvements to SH2 through the Waioeka Gorge (third).

Two of the projects ahead of the SH35/Hirini Street intersection project received funding in the latest National Land Transport Programme (NLTP) 2021-24, announced by Waka Kotahi on 31 August 2021. This suggests that the SH35/Hirini Street intersection project is one of the three highest priority projects in line for the next round of Waka Kotahi funding.

Of relevance to freight activity more generally, the RLTP also includes investment in:

- Road safety education and promotion;
- Speed management planning;
- Pavement maintenance;
- Strategic public transport and cycle network planning to achieve mode shift and reduce congestion on critical routes;
- Separated walking and cycle infrastructure, to minimise conflict between vehicle traffic and vulnerable road users;
- 50Max bridge upgrades; and
- Local road and state highway safety and resilience upgrades.

7.2 Gisborne District Council Long Term Plan

The GDC Long Term Plan (LTP) 2021-31 was adopted on 30 June 2021.

It reflects the above RLTP priorities and details planned investment in asset renewals as well as maintenance, minor intersection improvements, parking, public transport infrastructure, and new subdivision roading.

The LTP does not identify any specific transport capital works projects in the vicinity of the port. It does include $4.3M for non-specific road safety interventions and intersection works.

7.3 Waka Kotahi's Ongoing Intersection Improvement Investigations

Consultation with local Waka Kotahi staff indicates that it is considering a range of intersection improvements at Wainui Road (SH35)/Hirini Street, including both roundabout and signalised intersection treatments.

Both options have been assessed and evaluated in terms of their ability to accommodate the current operational base traffic volumes. Table 6 below summarises the results of the SIDRA modelling. As noted earlier (Section 6.2), intersections controlled by signals and roundabouts are evaluated based on the average delay across all legs of the intersection. Full SIDRA results and the modelled intersection layouts are included as Appendix E for the signal option and Appendix F for the roundabout option.

Parameter		Signals		Roundabout	
		AM Peak	PM Peak	AM Peak	PM Peak
Average Delay (s/vehicle)	Hirini Street	50	26	33	11
	SH35 East	14	13	8	6
	SH35 West	7	13	4	4
95th Percentile Queue (m)	Hirini Street	69	40	54	21
	SH35 East	282	121	120	44
	SH35 West	71	167	45	120
Intersection Average Delay (s/vehicle)		**14**	**12**	**9**	**5**
Intersection LOS		**B**	**B**	**A**	**A**

TABLE 6 – MODELLED BASE INTERSECTION PERFORMANCE (CURRENT OPERATIONAL VOLUMES), UPGRADED INTERSECTION

The Table illustrates that either form of intersection treatment being contemplated by Waka Kotahi would move the intersection from operating at LOS F during peak times to operating at LOS A or B. The roundabout generally offers better efficiency (in terms of lower delays and shorter queue lengths) however this is just one factor among many that will be considered by Waka Kotahi in developing the project. This analysis confirms that from a capacity point of view, either of the options being considered by Waka Kotahi would provide a solution for the existing issues at the intersection.

The overall conclusion from the above analysis of the SH35/Hirini Street intersection is that irrespective of the Proposal, the intersection is currently operating beyond its capacity in the peak travel periods (principally due to light vehicle usage). As recognised by the RLTP, this level of performance means that some form of intervention is already warranted at this intersection to support its existing function and general growth.

8 TRAFFIC GENERATION AND PARKING DEMAND OF THE PROPOSAL

8.1 Forecast Log Growth

Eastland Port is currently exporting approximately 3.0M m^3/annum[13]. Tairawhiti's wood resource harvest is expected to peak at approximately 4.2M m^3 annum before 2030[14].

8.2 Operational Effects of the Proposal

Fundamentally, the objective of the Proposal is to enable logs to move through the port at a more consistent rate.

EPL advises that its existing single berth and externalities such as weather (which can make the port completely inaccessible at times) present a serious restriction for the port and for export industries in the region more generally. Ships waiting on anchor in Turanganui-a-Kiwa/Poverty Bay is understood to be a common occurrence. The economic effects of this are addressed by other experts in other parts of the Application.

EPL's analysis indicates that its maximum daily load rate (the rate at which logs can be lifted onto a ship and the rows restocked) has reached an equilibrium and has not materially increased as new on and off-port storage areas have been developed.

There are several reasons for this including constrained physical space on the port, operational health and safety considerations and practises, and practical limitations such as the availability of trucks and drivers to move logs.

For these reasons, the primary effect of the Proposal from a transport perspective is that the port will be able to increase its average level of log loading daily activity. It is expected to achieve this by being active on more days each year (due to fewer shipping delays and weather interruptions) and achieving more consistent throughput on those days.

No significant increases in peak daily activity are expected to result from the Proposal, nor is the peak hour of activity on any day anticipated to be significantly affected. These peaks have limited potential for growth because of the constraints discussed above. It is the shoulder periods on Figure 38 (around the morning and evening peaks) and the lower volume days on Figure 20 that provide the opportunity to move more logs through the port (by achieving a higher daily average).

8.3 Light Vehicle Traffic Generation

The Proposal will require a larger workforce, with more staff involved with shipping, yard operations, and support functions such as management, workshop, and debarking. Other functions such as customs and security are not expected to change.

Based on information provided by EPL, the Proposal will generate approximately 65 new roles and result in up to 43 more staff being on site at any one time. The detailed breakdown of the expected changes by team is shown as Appendix A.

[13] Figure 7, Alternatives Assessment Report, EPL, August 2022
[14] Section 2.2, Alternatives Assessment Report, EPL, August 2022

Figure 40 summarises the consequential changes in light vehicle traffic generation associated with staff travel across the day. This analysis considers shift start and finish times and assumes (based on the findings of Section 4.6) that 80% of staff travel as a car driver. This is based on Census data[15] for Gisborne which indicates that 69% of people drive either a private or company car to work, with a buffer of 10% added for robustness.

The graph considers only the worst-case scenario of a ship (or ships) in port on a weekday. The graph presents combined arrival and departure volumes during each hour.

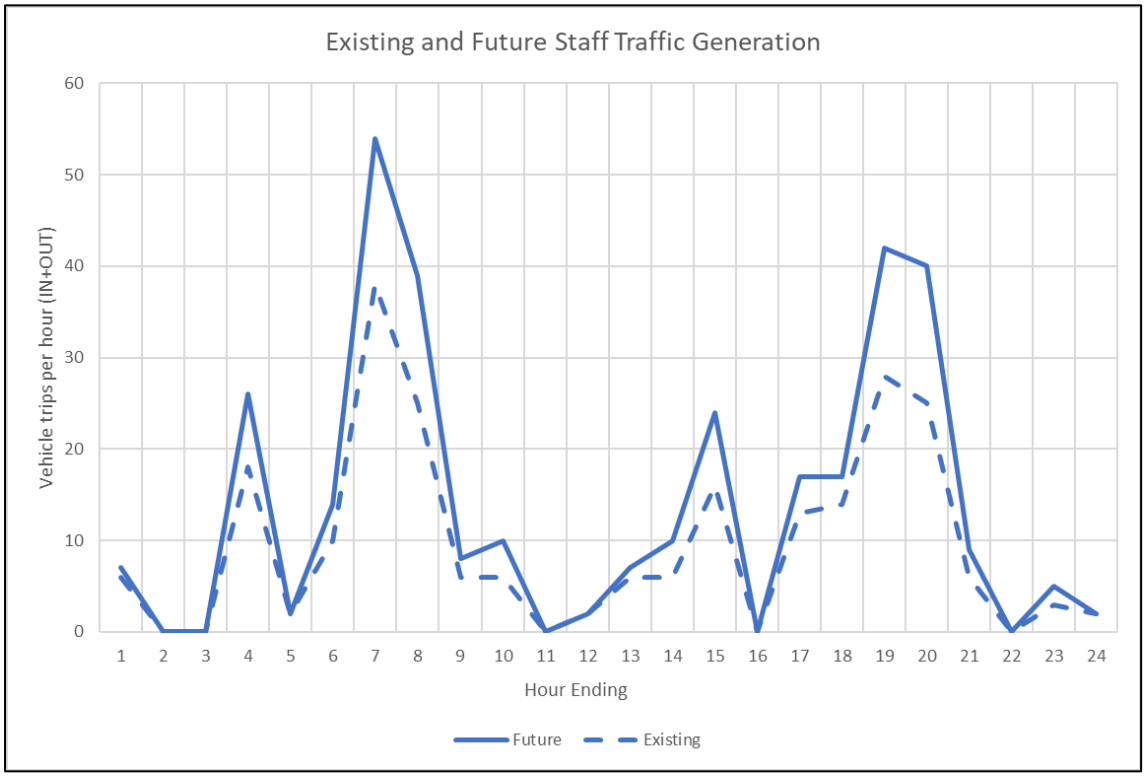


FIGURE 40 – EXISTING AND FUTURE STAFF TRAFFIC GENERATION

The graph shows that staff activity peaks between 6:00am and 7:00am. Activity during this hour is expected to increase from 38 vph to 54 vph because of the Proposal. There are also smaller peaks

[15] Main means of travel to work and workplace address by age group and sex, for the employed census usually resident population count aged 15 years and over, 2018 Census (Gisborne District).

between 2:00pm and 3:00pm (16 vph increasing to 24 vph); and between 6:00pm and 7:00pm (25 vph increasing to 42 vph).

Notably, the peak periods of staff activity are offset from those of the adjacent road network. This is illustrated on Figure 41 below. This graph shows the pattern of activity for the Wainui Road (SH35)/Hirini Street intersection (from Figure 38 above) and the pattern of the staff activity.

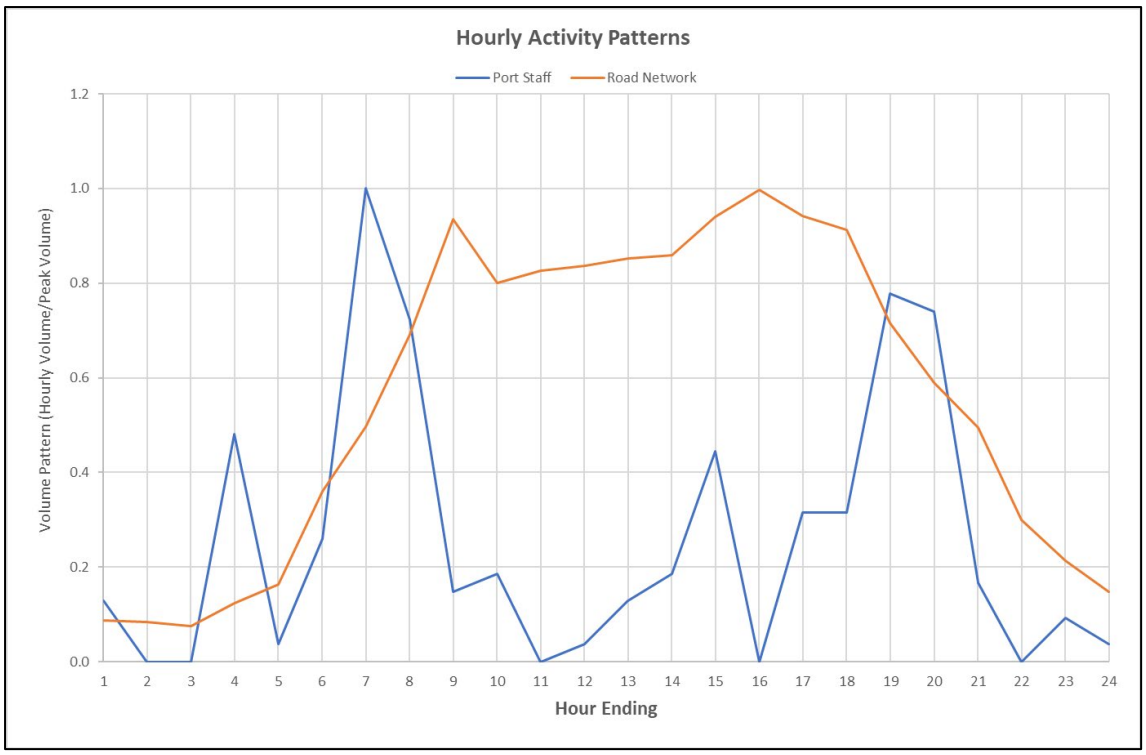


FIGURE 41 – STAFF PEAKS VERUS ROAD PEAKS

The bulk of the additional light traffic movements are expected to occur before 7am and after 7pm, when the adjacent road network is operating below its peak levels.

Over the course of a full day the additional light vehicle trips resulting from the operation of the Proposal is estimated as being up to 103 vpd when a ship is in port and 16 vpd when there are no ships in port. The effect of this change in vehicle movements on the transportation network is assessed at Section 9.1 below.

8.4 Parking Demand

The Proposal is expected to require 43 more staff to be on site at any one time. Using the rate of 0.8 spaces/employee established above at Section 4.6 , the Proposal would generate demand for 34 additional parking spaces.

8.5 Heavy Vehicle Trip Generation

The port currently generates up to 1,250 HCV/day on Hirini Street including an estimated 105 HCV/hour when operating at peak capacity. On an average day, HCV generation is some 800 HCV/day including 70 HCV/hour.

No significant increase in peak daily activity is anticipated as a result of the Proposal, because of the practical constraints on log handling and loading at the port.

Additionally, the port does not need to increase either its peak daily throughput or its peak hour throughput to meet future log export demands. The forecast peak annual demand of 4.2M m^3 of logs equates to an average of 13,900m^3 of logs per day[16]. The port can and does operate at this level already. It handled a volume of 13,900m^3 or more on 127 days in the three years to 31 March 2022 (as can be seen on Figure 20, earlier in this report). The Proposal is expected to enable these sorts of days to occur more regularly.

There is expected to be an increase of approximately 35% in average daily activity and average daily HCV volumes. This would move the average daily activity from 800 HCV/day to approximately 1,075 HCV/day. This would be the result of a combination of factors, including the demand for wood export (over which EPL has no control) and the enabling effects of the Proposal and the current operational and planned new off-port storage areas.

It is not anticipated that the Proposal will result in increases in peak hour traffic volumes. Instead, it presents an opportunity for spreading of traffic volumes across the day by smoothing the traditional pattern of HCV traffic movements (as shown earlier) and making better use of shoulder periods, as indicatively shown on Figure 42 below.

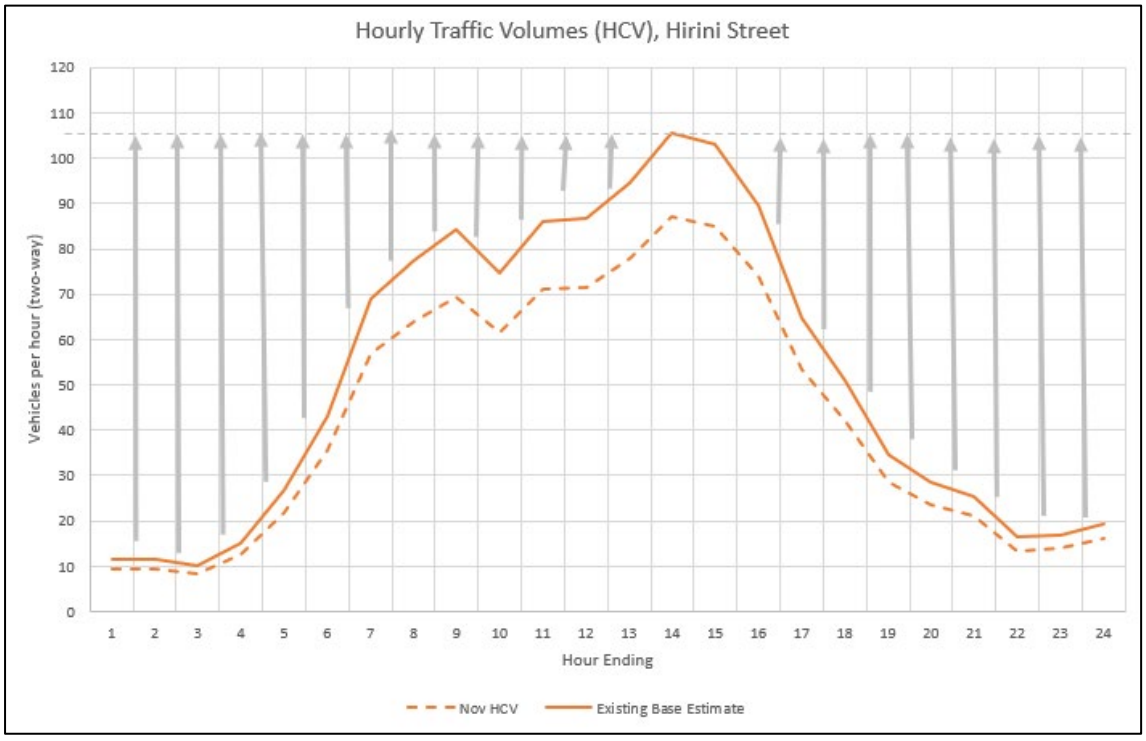


FIGURE 42 – HCV PATTERN AND SHOULDER PERIODS

This again would be enabled by a combination of the Proposal (which improves the turnover of ships) and the existing and planned future off-port storage areas (which improve the turnover of logs).

[16] Based on 4.2M cubic metres per annum and 302 working days in a year

9 OPERATIONAL TRAFFIC EFFECTS ASSESSMENT

9.1 Effects on the SH35/Hirini Street Intersection - Light Vehicles

The Proposal will increase the number of people working at the port and will therefore add some light vehicle movements through this intersection. The expected increases are summarised at Section 8.3. Some - but not all - of these movements use the SH35/Hirini Street intersection. Staff travelling in light vehicles also have the option of using Crawford Road if they are travelling to and from the east.

Because of staff shift times at the port, the Proposal adds a negligible volume of new traffic movements to the network during the existing peak periods at the intersection. Review of the profiles presented on Figure 40 shows that an additional 2 vph is expected in the existing morning peak between 8am and 9am, and no new movements are expected in the existing evening peak between 3pm and 4pm.

The Proposal is therefore not expected to have a material effect on the peak period operation of the intersection.

The largest increase in staff movements is an additional 16 vph (all inbound) between 6am-7am. The performance of the existing intersection during this hour, with and without the Proposal is summarised in Table 7 below.

Parameter	AM Staff Peak (6:00am to 7:00am)	
	Current Operational Base	Current Operational Base + Proposal
Hirini Street Right Turn Delay (s/vehicle)	16	17
Hirini Street Right Turn Queue (m)	2	3
Hirini Street Left Turn Delay (s/vehicle)	13	13
Hirini Street Left Turn Queue (m)	3	3
Worst Movement LOS	**C**	**C**

TABLE 7 – MODELLED (CURRENT OPERATIONAL) BASE AND WITH PROPOSAL INTERSECTION PERFORMANCE (6-7AM)

The Table illustrates that the existing intersection can operate at LOS C during this hour and continues to do so when the additional trips from the Proposal are added. This analysis confirms that outside of the peak periods, the intersection has adequate capacity to accommodate additional staff traffic movements.

9.2 Effects on the SH35/Hirini Street Intersection – Heavy Vehicles

For the reasons noted above at Section 8.5, the Proposal is not anticipated to result in increases in the peak hour HCV activity at the SH35/Hirini intersection, compared to the existing peak operations. Because intersection performance is assessed using peak hour volumes, the Proposal is not expected to materially reduce the performance of the intersection given it is already significantly under-performing.

Notwithstanding these conclusions, and to provide additional certainty as to potential impacts on the intersection, we have also undertaken an intersection assessment and evaluation in a sensitivity test scenario where HCV volumes on Hirini Street during the network peaks are increased by 20% (which is significantly greater than any increase anticipated to be generated by the Proposal). This assessment has considered the existing intersection layout (Stop control) and the two upgrade

options (signals and a roundabout) being considered by Waka Kotahi. Current operational base performance is presented again for comparison.

Parameter	Existing Intersection		Signals		Roundabout	
	Existing Operations Base	20% HCV increase	Existing Operations Base	20% HCV increase	Existing Operations Base	20% HCV increase
AM Peak Delay (s/vehicle)	420	460	14	15	9	10
AM Peak LOS	F	F	B	B	A	A
PM Peak Delay (s/vehicle)	73	86	12	13	5	6
PM Peak LOS	F	F	B	B	A	A

TABLE 8 –INTERSECTION PERFORMANCE WITH 20% INCREASE IN PORT HCVS

This analysis shows that in all cases, a 20% increase in HCV movements does not materially change the operating characteristics of the intersection and does not result in any change to the LOS of the intersection.

More specifically, either of the upgrade options being considered by Waka Kotahi would result in an LOS A or LOS B rating being maintained even with a 20% increase in HCVs at the port. If the existing intersection remains in place, it will continue to operate at LOS F even with a 20% increase in HCVs at the port (which is not anticipated). There is a modelled increase in average delay for the critical movement (right turns out of Hirini Street) however as explained earlier the key assessment measure for the intersection is its level of service and in any event as noted at Section 6.2, road user behaviour is likely to modify the actual delays that would materialise on street.

This is likely to include the same behaviour that is seen at the intersection now and that generally occurs at priority-controlled intersections operating at or over their theoretical capacity. Drivers are likely to adjust their routes or the timing of their trip to avoid the area or avoid the more difficult turning movements. The intersection is also likely to see more reverse priority operation (people on the major road letting in people from the minor road).

The intersection is also likely to be in its congested condition for longer periods through the day. Peak spreading, as this is known, is a common outcome in busy urban areas. The Proposal can also be expected to contribute to this, as it is expected to make greater use of shoulder periods, as illustrated earlier on Figure 42.

The overall conclusion of this analysis is the intersection of SH35/Hirini Street has recognised existing safety and capacity issues. This is acknowledged in the Tairawhiti RLTP and Waka Kotahi is investigating options to improve the existing intersection.

Efficiency and capacity issues exist at this intersection irrespective of the Proposal and the Proposal is not expected to result in any material contribution to the intersection's current poor performance. The intersection improvement in either of the two forms understood to be under consideration by Waka Kotahi will address the existing issues and can accommodate the demands generated by the Proposal. The majority of the benefits of the upgrade will be felt by the wider public.

EPL is a stakeholder in the intersection upgrade project and is understood to have participated in discussions with Waka Kotahi and GDC regarding the intersection upgrade. Such discussions involve

multiple parties representing different user groups and interests, which are all part of developing the preferred design solution.

As EPL does not control or manage the intersection it does not have the ability to change this part of the road network. It is therefore recommended that EPL continue to be involved in those discussions to enable the Proposal's Construction Traffic Management Plan (CTMP) and Operational Traffic Management Plan (OTMP) to be prepared in a manner that anticipates the future intersection arrangements and the timing for any upgrades. The CTMP and OTMPs are discussed in more detail at Section 10 and Section 9.7, respectively.

9.3 Wider Area Effects

As described in Section 8.1 above, demand for log exports is forecast to grow irrespective of the Proposal. From a transport perspective, if the Proposal did not proceed, the same volume of logs would be transported but potentially over a different timeframe and/or with more double handling if storage space on and off port is turning over at a slower rate. It is also possible that if logs cannot be exported efficiently from Gisborne, they could be transported to another port such as Tauranga or Napier.

Notwithstanding that growth in log volumes is not a direct effect of the Proposal, the link capacity analysis presented in Section 6.3 has also been repeated with a 20% increase in peak hour HCV volumes (consistent with the analysis above in Section in 9.1) added to all State Highways.

This analysis is highly conservative because it adds the increase of 21 HCV/hour (20% of the peak of 105 HCV/hour) to all the State Highway sites. This reflects a worst case of what would happen if all trucks travelled in the same direction on the same route. In practice, HCV trips are distributed in different directions and on multiple routes.

Despite these conservative assumptions, Figure 43 shows that all sites except the one already identified near the SH35/Hirini Street intersection, remain well within their capacities.

Site	NZTA ID	Location	Existing	With 20% Port HCV Increase					
			Volume/ Capacity Ratio	HCV/Hour	PCU/Hour	Directional Factor	PCU/Hour /Lane	Total PCU/Hour/ Lane	Volume/ Capacity Ratio
State Highway Sites	ID:00200428	ORMOND : Telemetry Site 26	25%	21	84	0.5	42	269	30%
	ID:00200441	Carringtons Culvert	30%	21	84	0.5	42	312	35%
	ID:00200444	200 m Nth of Bell Rd	53%	21	84	0.5	42	515	57%
	ID:00200448	Sth end of Whatatuna Bridge	35%	21	84	0.5	42	358	40%
	ID:00200452	Traffic Count Station 15	26%	21	84	0.5	42	273	30%
	ID:03500318	Gisborne: Okitu Reserve	29%	21	84	0.5	42	300	33%
	ID:03500321	108 WIM	46%	21	84	0.5	42	453	50%
	ID:03500324	Gisborne City Boundary	57%	21	84	0.5	42	559	62%
	ID:03500327	Sth of Harris St	148%	21	84	0.5	42	1,374	153%
	ID:03500328	intersection	47%	21	84	0.5	42	463	51%
	ID:03500332	LHS	46%	21	84	0.5	42	453	50%

FIGURE 43– LINK CAPACITY ASSESSMENT (EXISTING + 20% INCREASE IN PORT HCV)

As noted earlier, use of a 900 PCU/hour/lane threshold is a robust filter. The key determinant in the performance of the section of SH35 South of Harris Street is the SH35/Hirini Street intersection, which has been separately analysed at Section 9.1.

9.4 Port Access Effects

No changes are proposed to the port's access arrangements. These have been progressively upgraded to accommodate increasing log volume export demands and with a view to ultimately enable the Proposal.

The combination of truck volumes and passing volumes at the various gates, and the Crawford Road intersection, does not present any capacity or efficiency issues. Queuing can occur in the morning on Kaiti Beach Road, with trucks waiting in the shoulder areas, without impeding through traffic in either direction. This is understood to be associated with trucks waiting to be scaled. EPL is aware of this constraint and is looking to improve scaling facilities off-site at the proposed northern satellite yard at Tolaga Bay, and south of the city to minimise the delays and queues it currently generates.

All port gates have appropriate sight distances[17] for the speed environment and the safety history (as outlined above at Section 6.1) does not suggest any deficiencies with these. The Proposal is therefore not anticipated to have any effects on the traffic environment at the port access gates and no changes to these gates are therefore proposed or considered necessary to accommodate the Proposal.

9.5 Parking Effects

The Proposal is expected to generate demand for 34 additional staff parking spaces. The parking surveys showed that at least 65 spaces were available in parking areas on port land. This existing resource is therefore able to accommodate the increased parking demand generated by the Proposal, without any increased reliance on the shared on-street parking. No adverse effects such as reduced access to on-street parking are therefore anticipated as a result of the Proposal.

It is also recommended that cycle parking be provided for staff, to encourage use of alternative modes. These bike parks should be provided near the two pedestrian gates. A mode split target of 10-20% (equating to 14-28 bikes) is assessed as practical, based on the site location and the surrounding cycling infrastructure[18].

9.6 Road Safety Effects

The road safety review shows a mixture of crash types and no apparent issues with the port specifically.

The SH35/Hirini Street intersection is experiencing crashes above the typical rate, which reflects the existing congestion in the area and the poor (peak period) levels of service offered by the existing form of control.

[17] TRMP Rule H2 sight distance requirements (90m for Gate 4 and 40m for Gates 3, 5, 6 and 7) are met at all existing HCV gates that would also be used by the Proposal during the construction and operational phases.

[18] Austroads Research Report AP-R528-16 (Bicycle Parking Facilities: Updating the Austroads Guide to Traffic Management), gives recommended targets of 20% for Town Centres/Major Activity Centres and 10% for other urban environments.

As noted in Section 7.5, Waka Kotahi is the agency responsible for this intersection and it is understood to be in the process of developing improvement options for it. EPL, GDC and other parties are stakeholders in this process.

Internally, the movement of people and vehicles around the port is tightly controlled and managed by existing traffic management and safety systems. It is recommended that an Operational Traffic Management Plan (OTMP) be required as a condition of consent, to capture the port's existing safety related protocols update these to reflect the Proposal and any changes to the external transport network. Matters to be included in the OTMP are presented in Section 9.7.

9.7 Walking and Cycling Effects

The Proposal is expected to increase demand for staff travel to and from the site. On the basis of the assumptions developed for parking (that 70-80% of staff could travel as a car driver), up to 20-30% of staff could potentially travel by another mode including walking or cycling.

With 65 new roles expected to arise from the Proposal, this could result in up to 20 people making 40 additional walking or cycling trips (one to work, one away from work) each day.

The port has good connectivity to the walking and cycling network, primarily via the existing path on the western side of Rakaiatane Road and its onward connections to the Esplanade, Crawford Road and the path on the eastern side of Hirini Street. Its central location also gives it good walking and cycling catchments, as shown on Figure 44 and 45.

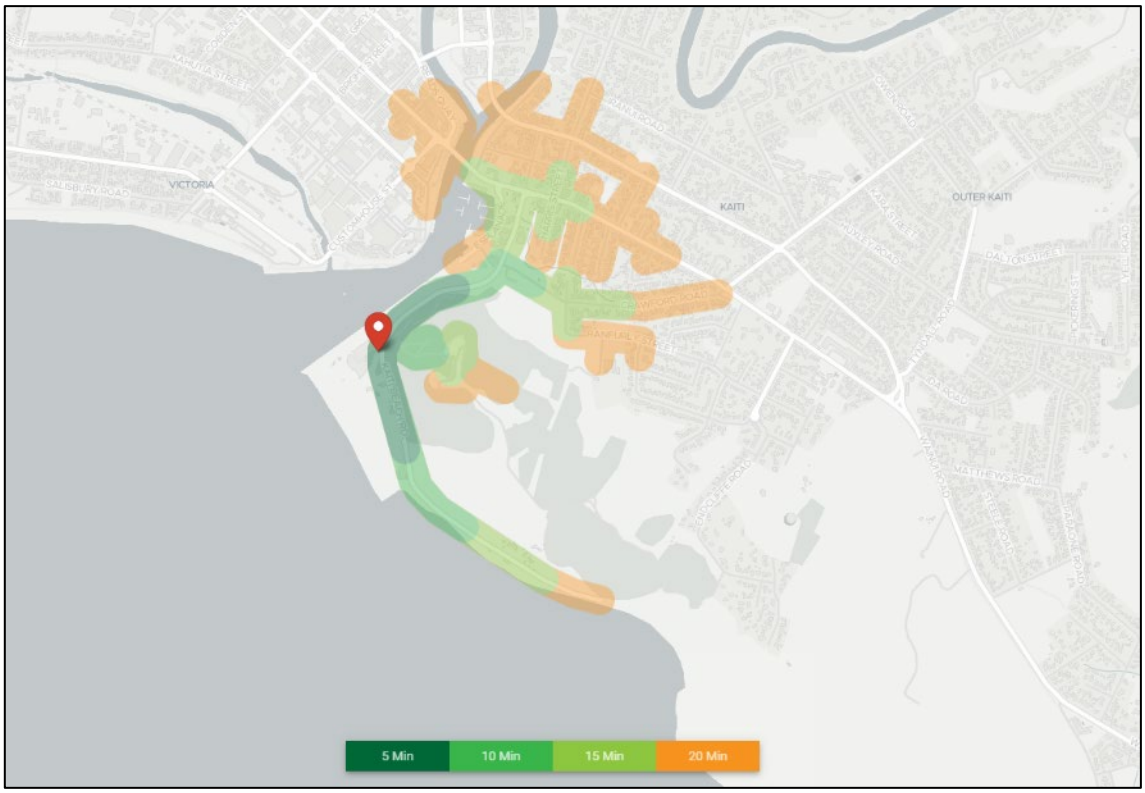


FIGURE 44 – WALKING CATCHMENT (5-20 MINUTES) (SOURCE: TARGOMO DEMO)

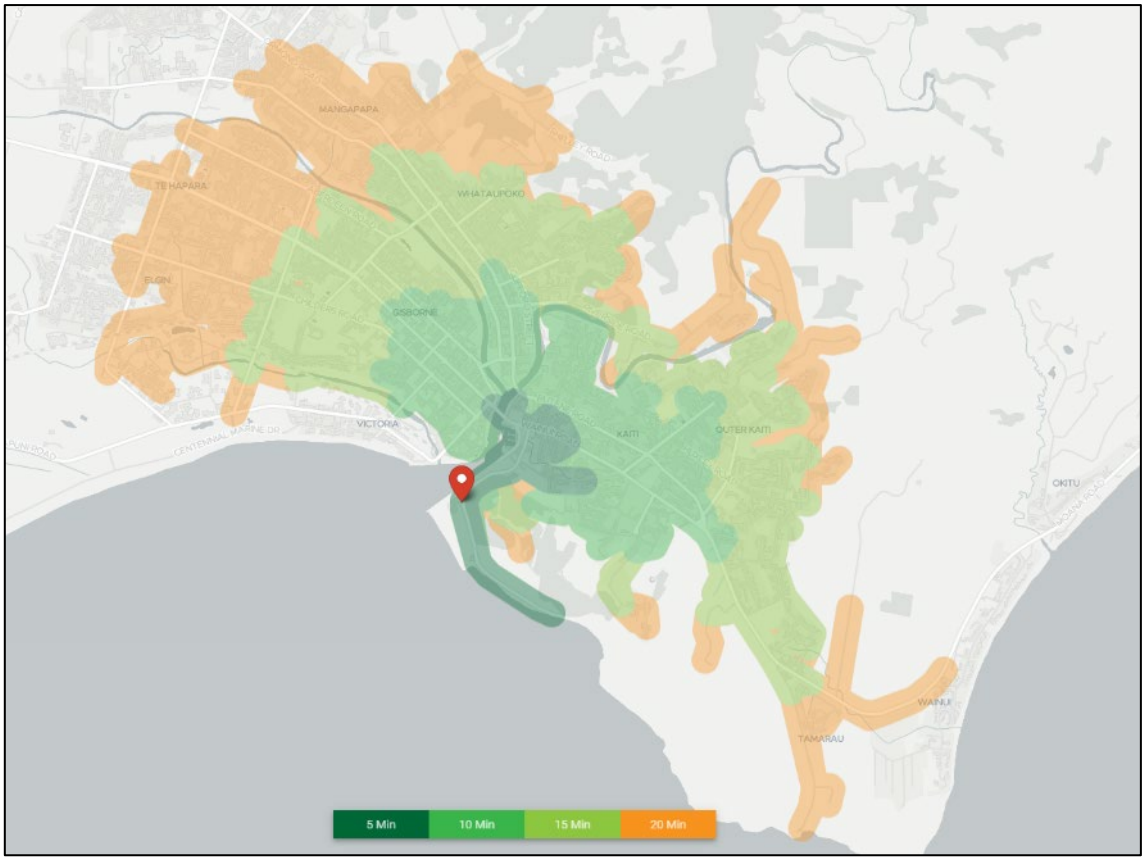


FIGURE 45 – CYCLING CATCHMENT (5-20 MINUTES) (SOURCE: TARGOMO DEMO)

Other than the recommended supply of staff cycle parking already noted at Section 9.4, no changes are considered necessary to support this potential new walking and cycling demand.

9.8 Operational Traffic Management Plan

An Operational Traffic Management Plan (OTMP) is recommended to be developed prior to the Proposal becoming operational. It should be prepared in consultation with Waka Kotahi and GDC and be submitted to GDC for certification prior to the completion of construction.

The objective of the OTMP would be to manage operational traffic effects to reduce impact on the transportation network to acceptable levels and its outline structure should include (but not be limited to):

- An overall access, parking and circulation layout (similar to the existing internal TMP shown as Figure 16);
- A summary of on-site parking supply and allocation including provision of at least one accessible parking space for people with disabilities (compliant with NZS4121 design standards);
- The number and location of cycle parking spaces;
- Measures to support/promote travel to the site by walking, cycling, public transport or other sustainable modes;
- Site safety protocols such as vehicle speed limits;

- Measures to avoid use of particular routes (for example Crawford Road to the east);
- Communication/stakeholder engagement measures; and
- Any other measures to minimise the operational traffic effects of the activity on the surrounding area.

With the OTMP in place, it is concluded that the operational effects of the Proposal can be appropriately managed and be no more than minor, within the expected transportation environment.

10 CONSTRUCTION TRAFFIC EFFECTS ASSESSMENT

The Engineering Report prepared for EPL by Worley[19] outlines the expected approach to construction of the Proposal. The final design is yet to be completed and construction methodology will be determined by the appointed contractor.

It is expected that the Proposal works would take approximately eight years to (complete post completion of stage one). While construction works would be subject to detailed design, it is currently expected that the construction work programme would start with the wharf extension, the reclamation and revetment, and the outer breakwater as a final stage.

The preliminary assessment prepared by Worley estimates that truck volumes will reach up to 150 HCV/day or 16 HCV/hour. These are two-way traffic movement totals, of inbound and outbound trucks.

Construction traffic will use the same transport connections as the operational activities at the site, using Kaiti Beach Road, Rakaiatane Road, Hirini Street and the SH35/Hirini Street intersection to connect to the State Highway network, or the Gisborne arterial network.

The tests described in Section 9.1 of this report assessed how the SH35/Hirini Street intersection would be affected by a hypothetical 20% increase in HCVs (operational traffic) turning in and out of Hirini Street.

This 20% change corresponded to an increase of 22 HCV/hour in the AM peak and 16 HCV/hour during the PM peak. These volumes match (in the AM peak) or exceed (in the PM peak) the expected volume of construction traffic. This intersection assessment and the State Highway capacity assessment presented in Section 9.2 can therefore also be used as the basis for assessing construction traffic effects.

The key is again the ability of the SH35/Hirini Street intersection to accommodate additional movements. Once through this intersection and on the State Highway network, a range of origins and destinations that may be used for plant and materials can be accessed.

The modelling analysis in Section 9.1 and Table 8 is a worst case from the point of view of construction effects, because it combines current operational base volumes (the peak day) with the 20% increase in HCV volumes.

It is also relevant to note that the traffic counts undertaken on Hirini Street across six different weeks identified that the existing HCV generation of the port ranged from 460 HCV/day to 1,175 HCV/day. The port's current operational base HCV traffic generation characteristics (presented in Table 2) can be described as 800 HCV/day plus or minus 400 HCV/day. The addition of 150 HCV/day during construction is well within the port's typical range of existing variation.

If construction activities were to combine with a higher volume day, the existing intersection is likely to experience increases in average delays and queue lengths, and the other outcomes described at Section 9.1 including avoidance of the intersection, adjustment of travel behaviour (different time, different mode) and more reverse priority operation (people on the major road letting in people

[19] Eastland Port Limited, Eastland Port Reclamation, Wharf 8 Extension and Outer Breakwater, DRAFT Engineering Report for Consent Application, Rev D, 20 August 2021

from the minor road). The intersection is also likely to be in its congested condition for longer periods through the day. Peak spreading is a common outcome in busy urban areas.

Construction activities will also add demand for light vehicle travel to and from the site. However, as illustrated in the operational assessment (Section 9.1) start times in construction are likely to be early and additional movements in the shoulder periods do not generate significant adverse effects.

It is recommended that construction effects are managed through a Construction Traffic Management Plan (CTMP) prepared by EPL and/or the appointed contractor(s) in consultation with Waka Kotahi and GDC and submitted to GDC for certification prior to commencement of construction activities.

The objective of the CTMP would be to manage construction traffic effects to reduce impact on the transportation network to acceptable levels and its outline structure would include (but not be limited to):

- Construction staging and programme;
- Light and heavy vehicle demands in each phase of activity;
- Transport routes;
- Measures to avoid use of particular routes (for example Crawford Road to the east) or particular times of day (commuter peaks for example);
- Separation of construction activities from ongoing port operations;
- Nominated access points and parking areas for construction staff and visitors;
- Contractor office(s) and amenities;
- Communication/stakeholder engagement measures;
- Any temporary traffic management controls (on or off site); and
- Contractor contacts.

The CTMP should include consideration of the merits, if deemed necessary, of implementing part-time or full-time temporary traffic management controls at the SH35/Hirini Street intersection to manage safety and efficiency effects. As CTMPs are prepared just prior to construction and are generally updated throughout construction (at least to reflect major construction phases) it can also respond to any changes that Waka Kotahi or GDC make to the transport networks in the area prior to the commencement of construction.

With the CTMP in place, it is concluded that the construction effects of the Proposal can be appropriately managed to being no more than minor, within the expected transportation environment.

11 TAIRAWHITI RESOURCE MANGEMENT PLAN (TRMP)

11.1 Rules

Section C2.1.7H of the TRMP contains provisions regarding roading and transport infrastructure requirements. These are summarised in Table 9 below.

Rule	Requirement	Compliance/Comments
H1	**Infrastructural Requirements**	
a	All proposed new roads shall connect to, and be compatible with, the district roading hierarchy, as depicted in the roading hierarchy maps	No new roads are proposed. The Proposal will use the existing port connections which connect appropriately to the district roading network and onward to the State Highway network.
b	To meet the access needs of potential users, all new or upgraded roads required for subdivision or development shall comply with the following rules for minimum widths.	No new roads proposed.
C	N/A	N/A
H2	**Sightlines**	
a	All new vehicle crossing /accessways shall be designed, located and developed to ensure that the sight lines (illustrated in Figure C2.13) are established and maintained with no obstructions, whether temporary or permanent. Sight lines are to be in accordance with Figure C2.1.3 and Figure C2.4 specified below	No new vehicle crossings, accessways or intersections are proposed. Sight distance requirements (90m for Gate 4 and 40m for Gates 3, 5, 6 and 7) are met at all existing HCV gates that would also be used by the Proposal during the construction and operational phases.
B	All new intersections shall be designed, located and developed to ensure that the sight lines (illustrated in Figure C2.1.3) are established and maintained with no obstructions, whether temporary or permanent. Sight lines are to be in accordance with Figure C2.13 and Figure C2.4 specified below. ***In areas with 50km/h operating speeds, 40m is required on Local or Collector roads and 90m is required on Principal or Arterial roads.***	
H3	**Turning Areas**	
a	Turning areas for cul de sacs (illustrated in Figure C2.15) shall be constructed to accommodate the manoeuvring of vehicles as specified below: Industrial/Port – 99 percentile truck	No new cul de sacs are proposed. The port is already designed to accommodate the largest type of vehicles it receives. This will continue to be the case following the Proposal.
I1	**Sight Lines at Vehicle Crossings**	
a	All vehicle crossings shall be constructed and located to ensure that the sight lines specified in Figure C2.4 are maintained with no obstructions, whether temporary or permanent, for the distances specified in Figure C2.13.	As noted above for H2(a) and (b).
I2	**Distances of Vehicle Crossings from Intersections**	
a	Sites shall maintain distances of crossings from intersections, so as to comply with Figures C2.6 and C2.7.	No changes are proposed to the locations of vehicle crossings or intersections.
I3	**Manoeuvring Areas**	
a	Subject to (b) with the exception of sites containing no more than one single dwelling unit, all sites, where on-site car parking is provided, shall provide either accessways, aisles and turning areas or parking spaces adequate to enable vehicles to enter and exit to the road in a forward direction	The existing port is designed so that the relevant design vehicles can enter and exit without reversing to or from the public road network. This is expected to continue following the Proposal.
B	Sites fronting arterial roads: The construction, addition to, or alteration of buildings (including new dwelling units) shall not encroach on or reduce on-site manoeuvring areas beyond the point that they continue to provide the ability for vehicles to enter and exit to the road in a forward direction.	
I4	**Surfaces**	

Rule	Requirement	Compliance/Comments
a	N/A	
b	N/A	
c	All accessways and associated turning areas for industrial and commercial activities shall be: i. Finished with a sealed surface and drained in residential, commercial or industrial zones or reserves adjoining these zones. Ii. Finished with a hard surface in rural zones, or reserves adjoining rural zones.	All port surfaces are, and will continue to be, finished to the appropriate standard.
I5	**Access to sites with more than one road frontage**	
a	For properties that have legal frontage on to two roads: i. Where the property is located in a Rural zone and adjoins an arterial or principal road, access shall be from the road with the lesser traffic function, as identified in the Roading Hierarchy Maps. Ii. Where the property is located in a Commercial zone, Industrial zone or a Port Management zone, and adjoins an arterial or principal road, access shall be from the road with the lesser traffic function, as identified in the Roading Hierarchy Maps.	No changes are proposed to port accesses or road frontage connections.
I6	**Minimum distance between vehicle crossings**	
a	The minimum distance between vehicle crossings on any one site shall be 15m.	No new vehicle crossings proposed.
B	In commercial zones, industrial zones and the Port Management zones the minimum distances between vehicle crossings on any two adjacent sites shall be 2m, unless a combined crossing not exceeding 9m serves the two adjacent sites, or the vehicle crossing is for two or more residential dwelling units located on the one site.	
I7	**Single-site vehicle access**	
a	The width of accessways and vehicle crossings for individual sites shall comply with the rules in Figure C2.8.	No changes are proposed to the port's overall access arrangements.
B	The number of accessways and vehicle crossings onto a road frontage on any one site shall not exceed that shown in Figure C2.9. and	
c	Accessways shall comply with the standards set out in New Zealand Fire Service fire-fighting water supplies Code of Practice SNZ 4509:2008.	
I8	**Multiple-site access and/or multiple unit access**	
	N/A	N/A
J	**Parking**	
J1	**<u>Provision of parking and loading spaces</u>**	
a	Unless otherwise provided for in this chapter, loading bays shall be provided on site in accordance with Figure C2.11 below. ***Warehouses, auction rooms and bulk storage facilities, depots: 1 plus 1 space per 1000m^2 of GFA over 2000m^2***	Port activities are not listed in Figure C2.11. In lieu of this, the most comparable activity appears to be 'warehouses, auction rooms and bulk storage facilities, depots'. The Zero Store facility at the Port has a GFA of 2,720m^2. This generates a requirement for two loading spaces to be provided, which is easily achieved. The port is an integrated facility on a large mostly open-air site that does not use loading bays in the same way a conventional warehouse or depot does. Loading and unloading is provided for around the site and managed internally by EPL. There is no reliance on the public road network for loading and this is expected to continue following the Proposal.
J2	<u>Waiver of parking space or loading bay requirements</u>	
	N/A	N/A
J3	**<u>Assessment of number of spaces</u>**	

Rule	Requirement	Compliance/Comments
	The required number of disabled parking spaces and loading bays shall be: i. Calculated in respect of each activity undertaken on the site. Ii. Re-calculated in the event of a change in activity. Iii. Re-calculated in the event of a change in the scale or intensity of land use	See discussion below at Section 11.1.1 regarding disabled parking spaces.
J4	Sharing of parking and loading spaces	
a	N/A	N/A
J5	**Availability of spaces**	
a	All required loading and parking spaces shall be kept clear and available for use of occupants or visitors during the normal hours of operation of that use.	Loading areas are managed by EPL as noted against Rule J1(a) above. Parking spaces are available for their intended purpose.
b	With the exception of the following activities, no parking space or loading bay shall obstruct access to any other parking space or loading bay: i. Parking spaces for single residential or minor dwelling units. Ii. Parking spaces for home occupations. Iii. Parking spaces for service stations.	
J6	**Provision of Parking Spaces for the Disabled**	
a	Parking spaces for disabled persons shall be provided in accordance with New Zealand Standard NZS 4121:1985: Design for Access and Use of Buildings and Facilities by Disabled Persons.	See discussion below at Section 11.1.1
J7	**Design and Construction of Parking Spaces**	
a	The gradient of any parking space used for industrial or commercial activities shall not exceed 1:20	Existing areas and any future changes expected to comply.
b	Where the public make use of vehicle parking spaces at night they shall be lit in accordance with Australian Standard AS 1158.1:1986: ASS Public Lighting Code.	
D	All parking spaces shall be formed and constructed to comply with either the following rules for dimensions in Figure C2.12 (to accommodate the 90 percentile car illustrated in Figure C2.12 or the Australian/New Zealand Standard AS/NZS 2890.1:2004, Part 1 off-street car parking or any subsequent replacement AS/NZS for this standard	
d	All carparks and associated turning areas for activities other than residential activities shall be sealed and drained.	
J8	**Design and Construction of Loading Bays**	
a	All loading areas shall be a minimum of 3m wide and 8.5m in length and be capable of accommodating a vehicle 3m in height. Turning areas shall be based on the 99 percentile two-axle truck tracking curve illustrated in Figure C2.15.	N/A as per discussion at Rule J1(a) above.
b	The gradient of any loading bay shall not exceed 1:20.	Existing areas and any future changes expected to comply.
c	All loading bays and associated turning areas shall be hard surfaced and drained.	

TABLE 9 –TRMP RULES ASSESSMENT

11.1.1 Disabled/Accessible Parking

NZS 4121:2001 requires accessible parking spaces for people with disabilities to be provided at the rate of not less than:

- One for parking areas with between 1 and 20 spaces;
- Two for parking areas with between 21 and 50 spaces; and
- One for every additional 50 car parks or part thereof.

On the basis that the Proposal generates demand for 34 additional parking spaces (in an area that already has more than 50 spaces) it would be required to provide one accessible parking space. It is

recommended that at least this many accessible spaces be provided in a location that is close to where staff and/or visitors need to go on the site. This can be included in the OTMP.

The space needs to meet the minimum dimensional requirements of 5.0m long, 3.5m wide (including a 1.1m hatched zone) and a 2.5m height clearance.

11.1.2 Overall TRMP Rules Assessment

The Proposal will integrate with and utilise the port's established vehicle access and parking arrangements. No specific changes are proposed or required to these existing arrangements except for one additional accessible parking space being provided.

The port is a dynamic environment in which all operational activities including parking, access, loading and the movement of people around the site, are managed and monitored by EPL, and reviewed on a regular basis. The Proposal is expected to integrate with this framework and be managed in the same way.

As described at Section 9.8, an OTMP is recommended as a condition of consent. This would capture the detail of these matters and if changes to parking or access are proposed, GDC would have the opportunity to review them as part of the certification process.

A separate CTMP is also recommended and discussed at Section 10.

12 OVERALL CONCLUSION OF TRAFFIC EFFECTS

East Cape Consulting (ECC) has been engaged by Eastland Port Limited (EPL) to prepare a Transportation Assessment Report (TAR) for Stage 2 of its proposed expansion and upgrade of Eastland Port in Gisborne.

The full project is known as the Twin Berth Project (TBP) and is designed to enable two ships up to 200m long to berth at the port simultaneously, unlocking greater capacity for bulk freight and potential options for container freight in future.

The Proposal is expected to increase the port's average daily throughput and enable Eastland Port to meet forecast log export demand from the Tairawhiti. It is not expected to significantly increase its *peak* daily throughput or its *peak* hour throughput because of other constraints including space, safety, and the availability of other resources as detailed in this report.

Based on the assessments carried out in this report, we recommend the following mitigation measures are incorporated into the construction and operation phases of the Proposal:

- A construction traffic management plan (CTMP) is prepared to detail and manage construction effects as a condition of consent, to be prepared and certified when the contractor is appointed, and the construction methodology is known.
- An operational traffic management plan (OTMP) is prepared to detail and manage operational traffic and parking effects as a condition of consent, to be prepared and certified prior to the completion of construction. This should specifically detail:
    - The provision of at least one accessible parking space for people with disabilities.
    - Supply of at least 14 cycle parking spaces;
    - The overall approach to access, parking, and circulation with the Proposal completed; and
    - Any measures to manage and minimise potential safety and efficiency effects on external transport network (for example requests made of drivers to use/avoid routes).

We also understand that EPL will continue to participate in discussions with Waka Kotahi regarding the timing of Waka Kotahi's upgrade of the SH35/Hirini Street intersection. We support the continuation of those discussions given the intersection is already operating beyond its capacity at peak times.

With the implementation of the above mitigation measures, and recognising the ongoing discussions regarding the SH35/Hirini Street intersection, we consider that the construction and operational traffic effects of the Proposal can be managed to be no more than minor.

East Cape Consulting

11 August 2022

End

APPENDIX A – Staff Numbers

Existing Staff Numbers

Organisation	Operation	Shift times			Staff
ISO	Shipping	700	1900	When ship in port	30
		1900	700	When ship in port	30
	Yard operations	400	1400	Monday - Friday	18
		600	1600	Monday - Friday	8
		1000	2000	Monday - Friday	7
		1400	2400	Monday - Friday	4
	Workshop	700	1700	Monday - Friday	6
	Management	900	1700	Monday - Friday	8
EPL	Yard operations	500	1400	Monday - Friday	2
		700	1600	Monday - Friday	2
		1000	1900	Monday - Friday	1
	Debarker	400	1230	Monday - Friday	4
		1400	2230	Monday - Friday	4
	Workshop	700	1600	Monday - Friday	2
	Management	700	1600	Monday - Friday	2
	Port Protection	600	1800	24 hours	2
		1800	600	24 hours	2
NZ Customs	Security officers	0	600	24 hours	3
		600	1200	24 hours	3
		1200	1800	24 hours	3
		1800	2400	24 hours	3
	Management	900	1700	Monday - Friday	1
					Total
Notes:					
	EPL management and marine team located at 2 Crawford Rd considered off port				
	Accurate on 17th August 2021				

Existing people on port by hour (weekday ship in port):

Hour ending																							
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
							30	30	30	30	30	30	30	30	30	30	30	30					
30	30	30	30	30	30	30													30	30	30	30	30
				18	18	18	18	18	18	18	18	18	18										
						8	8	8	8	8	8	8	8	8	8								
										7	7	7	7	7	7	7	7	7	7				
														4	4	4	4	4	4	4	4	4	4
							6	6	6	6	6	6	6	6	6	6							
									8	8	8	8	8	8	8	8							
					2	2	2	2	2	2	2	2	2										
							2	2	2	2	2	2	2	2	2								
										1	1	1	1	1	1	1	1	1					
				4	4	4	4	4	4	4	4	4											
														4	4	4	4	4	4	4	4	4	
							2	2	2	2	2	2	2	2	2								
							2	2	2	2	2	2	2	2	2								
						2	2	2	2	2	2	2	2	2	2	2	2						
2	2	2	2	2	2												2	2	2	2	2	2	2
3	3	3	3	3	3																		
						3	3	3	3	3	3												
												3	3	3	3	3	3						
																		3	3	3	3	3	3
								1	1	1	1	1	1	1	1	1							
35	**35**	**35**	**35**	**57**	**59**	**67**	**79**	**80**	**88**	**96**	**96**	**96**	**92**	**80**	**80**	**66**	**53**	**51**	**50**	**43**	**43**	**43**	**39**

Staff Numbers with Proposal

Organisation	Operation	Shift times			% Increase due to twin berth	Existing Staff	**Total Staff (Ex+New)**
ISO	Shipping	700	1900	When ship in port	60%	30	**48**
		1900	700	When ship in port	60%	30	**48**
	Yard operations	400	1400	Monday - Friday	50%	18	**27**
		600	1600	Monday - Friday	50%	8	**12**
		1000	2000	Monday - Friday	50%	7	**11**
		1400	2400	Monday - Friday	50%	4	**6**
	Workshop	700	1700	Monday - Friday	20%	6	**7**
	Management	900	1700	Monday - Friday	20%	8	**10**
EPL	Yard operations	500	1400	Monday - Friday	50%	2	**3**
		700	1600	Monday - Friday	50%	2	**3**
		1000	1900	Monday - Friday	50%	1	**2**
	Debarker	400	1230	Monday - Friday	50%	4	**6**
		1400	2230	Monday - Friday	50%	4	**6**
	Workshop	700	1600	Monday - Friday	20%	2	**2**
	Management	700	1600	Monday - Friday	20%	2	**2**
	Port Protection	600	1800	24 hours	0%	2	**2**
		1800	600	24 hours	0%	2	**2**
NZ Customs	Security officers	0	600	24 hours	0%	3	**3**
		600	1200	24 hours	0%	3	**3**
		1200	1800	24 hours	0%	3	**3**
		1800	2400	24 hours	0%	3	**3**
	Management	900	1700	Monday - Friday	0%	1	**1**
						145	**210**

People on port by hour (weekday ships in port), with Proposal:

Hour ending																							
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
							48	48	48	48	48	48	48	48	48	48	48	48					
48	48	48	48	48	48	48													48	48	48	48	48
				27	27	27	27	27	27	27	27	27	27										
						12	12	12	12	12	12	12	12	12	12								
										11	11	11	11	11	11	11	11	11	11				
														6	6	6	6	6	6	6	6	6	6
							7	7	7	7	7	7	7	7	7	7							
									10	10	10	10	10	10	10	10							
					3	3	3	3	3	3	3	3	3										
							3	3	3	3	3	3	3	3	3								
										2	2	2	2	2	2	2	2	2					
				6	6	6	6	6	6	6	6	6											
														6	6	6	6	6	6	6	6	6	
							2	2	2	2	2	2	2	2	2								
							2	2	2	2	2	2	2	2	2								
						2	2	2	2	2	2	2	2	2	2	2	2						
2	2	2	2	2	2												2	2	2	2	2	2	2
3	3	3	3	3	3																		
						3	3	3	3	3	3												
												3	3	3	3	3	3						
																		3	3	3	3	3	3
								1	1	1	1	1	1	1	1	1							
53	53	53	53	86	89	101	115	116	126	139	139	139	133	115	115	96	80	78	76	65	65	65	59

Existing data and forecasts provided by EPL

APPENDIX B – COVID19 Lockdown Effects

Data from the Waka Kotahi count site south of Harris Street was reviewed for the full year August 2019 to August 2020 to confirm that traffic volumes had returned to their normal levels following New Zealand's Covid19 lockdown starting in March 2020.

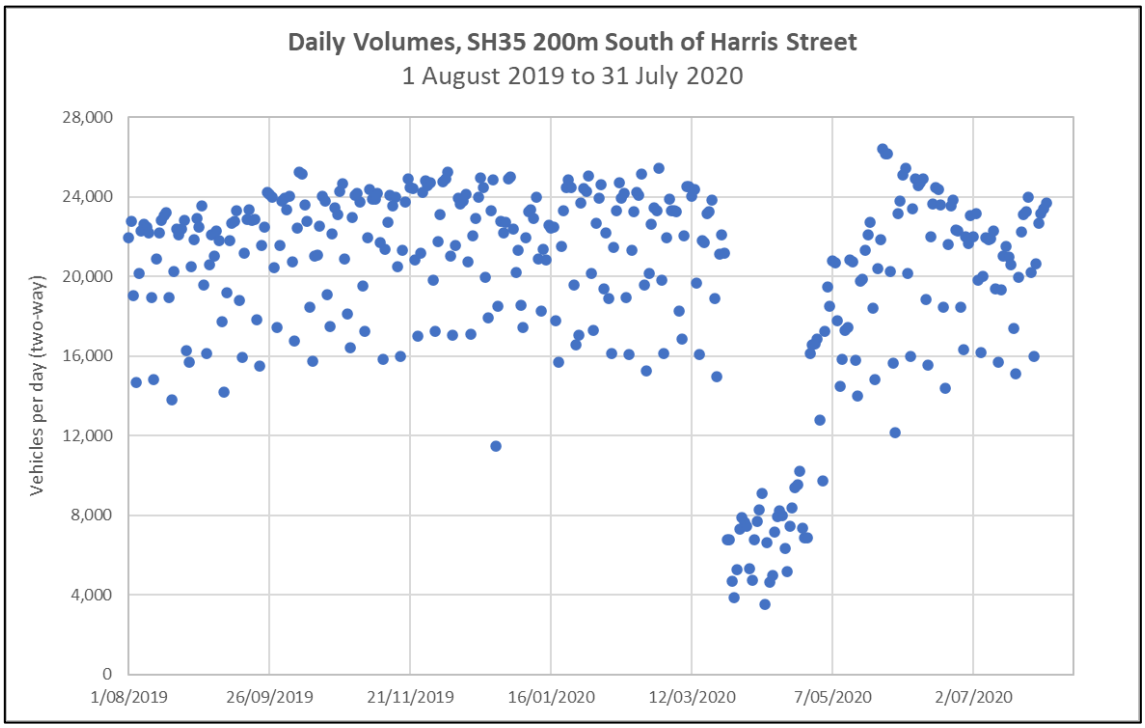


FIGURE B1 – DAILY VOLUMES ON WAINUI ROAD (SH35), AUGUST 2019 TO AUGUST 2020

The effects of lockdown are evident in March and April. Volumes recovered as restrictions were eased and had returned to normal levels by June.

This confirms that the surveys conducted by ECC in September 2020 were reasonably reflective of normal network conditions.

APPENDIX C – Crash Analysis System (CAS) Summary

CODED CRASH ID	Crash road	Distance	Direction	Side road	Easting	Northing	Longitude	Latitude	ID	Date	Day of week	Time	Description of events	Crash factors	Surface condition	Natural light	Weather	Junction	Control	Crash count fatal	Crash count severe	Crash count minor	Social Cost $(m)
1241783	RAKAIATANE ROAD	449	S	CRAWFORD ROAD	2037361	5707381	178.026437	-38.674111	2020158564	3/07/2020	Fri	4:25	SUV1 WDB on RAKAIATANE ROAD lost control turning left; went off road to right, SUV1 hit kerb, fence	SUV1, alcohol suspected, lost control when turning, ENV: heavy rain	Wet	Dark	Heavy rain	Nil (Default)	Nil	0	0	0	0.03
1204814	KAITI BEACH ROAD	652	W	CRAWFORD ROAD	2037291	5707192	178.025757	-38.675838	201969737	4/06/2019	Tue	9:05	Truck1 NDB on Kaiti Beach Road swinging wide hit Other2 head on	TRUCK1, other inattentive, swung wide at intersection	Dry	Bright sun	Fine	Driveway	Nil	0	0	0	0.03
1269065	KAITI BEACH ROAD	1115	S	CRAWFORD ROAD	2037373	5706748	178.02698	-38.679781	2021195394	20/06/2021	Sun	0:15	Car/Wagon1 SDB on Kaiti beach road lost control on curve and hit Ute2 head on	CAR/WAGON1, alcohol test above limit or test refused, drugs suspected, lost control when turning, speed entering corner/curve UTE2, alcohol test below limit	Wet	Dark	Light rain	Nil (Default)	Unknown	0	0	1	0.1
1261703	KAITI BEACH ROAD	1151	S	CRAWFORD ROAD	2037392	5706721	178.027208	-38.680017	2021189473	23/01/2021	Sat	19:30	Car/Wagon1 NDB on Kaiti beach road hit Pedestrian2 (Age 10) crossing road from left side	CAR/WAGON1, did not check/notice another party from other dirn, PEDESTRIAN2, pedestrian running across, heedless of traffic	Dry	Bright sun	Fine	Nil (Default)	Nil	0	0	1	0.1
1149630	ESPLANADE		I	WAINUI ROAD	2037734	5707874	178.030396	-38.669502	201814977	6/06/2018	Wed	16:10	SUV1 NDB on Esplanade hit Wheeled pedestrian (wheelchairs, mobility scooters, etc) 2 (Age 83) crossing road from left side	SUV1, alcohol test below limit, did not check/notice another party from other dirn, WHEELED PEDESTRIAN (WHEELCHAIRS, MOBILITY SCOOTERS2, alcohol impaired non-driver (pedestrian/cyclist/pa	Dry	Overcast	Fine	T Junction	Stop	0	1	0	1.13
1109680	HIRINI ST		I	CRAWFORD ROAD	2037752	5707562	178.030792	-38.672295	201714173	18/05/2017	Thu	22:08	Truck1 NDB on Crawford road lost control turning right	TRUCK1, misjudged another vehicle	Dry	Dark	Fine	T Junction	Give way	0	0	1	0.1
1192256	RAKAIATANE ROAD		I	CRAWFORD ROAD	2037750	5707559	178.030792	-38.672318	2018101132	7/12/2018	Fri	10:10	Truck1 NDB on RAKAIATANE ROAD lost control turning right; went off road to left	TRUCK1, alcohol test below limit, lost control when turning, other inappropriate speed	Dry	Bright sun	Fine	T Junction	Nil	0	0	0	0.03
1283496	RAKAIATANE ROAD		I	CRAWFORD ROAD	2037751	5707559	178.030791	-38.672317	2021205350	18/11/2021	Thu	15:00	Ute1 NDB on RAKAIATANE ROAD hit rear of Van2 NDB on RAKAIATANE ROAD turning right from centre line	UTE1, failed to notice car slowing, stopping/stationary, other inattentive	Dry	Bright sun	Fine	T Junction	Give way	0	0	1	0.1
1243999	WAINUI ROAD	32	W	HIRINI STREET	2037825	5707845	178.031461	-38.669719	2020159502	22/07/2020	Wed	17:16	Car/Wagon1 EDB on WAINUI ROAD hit rear end of Car/Wagon2 stop/slow for queue	CAR/WAGON3, alcohol test below limit CAR/WAGON1, alcohol test below limit, failed to notice car slowing, stopping/stationary, speed on straight CAR/WAGON2, alcohol test below limit	Dry	Twilight	Fine	Nil (Default)	Nil	0	0	0	0.03
1303898	WAINUI ROAD	32	E	ESPLANADE	2037809	5707850	178.031274	-38.669674	2021220324	26/07/2021	Mon	20:32	load or trailer from Truck1 EDB on WAINUI ROAD hit VEHB, Truck1 hit building, traffic sign		Null	Unknown	Null	Nil (Default)	Nil	0	0	0	0.03
1277193	WAINUI ROAD		I	ESPLANADE	2037766	5707863	178.030769	-38.669582	2021184219	20/03/2021	Sat	20:45	Car/Wagon1 EDB on WAINUI ROAD hit Car/Wagon2 merging from the right	CAR/WAGON1, alcohol test below limit, new driver/under instruction CAR/WAGON2, alcohol test above limit or test refused, failed to give way at priority traffic control	Dry	Dark	Fine	T Junction	Stop	0	0	0	0.03
1245624	WAINUI ROAD		I	HIRINI STREET	2037850	5707835	178.031753	-38.669792	2020161638	31/07/2020	Fri	21:25	Car/Wagon1 and Car/Wagon2 both EDB on WAINUI ROAD and turning; collided	CAR/WAGON1, alcohol test above limit or test refused, evading enforcement, other inappropriate speed CAR/WAGON2, alcohol test below limit	Dry	Dark	Fine	T Junction	Stop	0	0	0	0.03
1281217	WAINUI ROAD	22	W	HIRINI STREET	2037837	5707840	178.031603	-38.669757	2021185533	25/04/2021	Sun	6:32	Car/Wagon1 NDB on WAINUI ROAD hit VEHB manoeuvring, Car/Wagon1 hit fence, retaining wall	CAR/WAGON1, alcohol test below limit, other fatigue	Dry	Bright sun	Fine	Driveway	Nil	0	0	0	0.03
1152641	SH 35	15	E	HIRINI ST	2037873	5707830	178.032013	-38.66983	201818007	19/09/2018	Wed	10:23	Car/Wagon1 WDB on WAinui hit rear end of Car/Wagon2 stop/slow for queue	CAR/WAGON1, alcohol test below limit, following too closely	Dry	Overcast	Fine	Nil (Default)	Unknown	0	0	1	0.1
1256857	HIRINI STREET		I	WAINUI ROAD	2037855	5707825	178.031822	-38.669876	2020168774	26/09/2020	Sat	11:00	Car/Wagon1 NDB on HIRINI STREET hit rear end of Car/Wagon2 stop/slow for cross traffic	CAR/WAGON1, did not stop at stop sign, following too closely	Dry	Bright sun	Fine	T Junction	Stop	0	0	0	0.03
1269431	HIRINI STREET		I	WAINUI ROAD	2037854	5707825	178.031801	-38.669884	2021195663	24/07/2021	Sat	0:01	Car/Wagon1 EDB on Wainui Road lost control turning right; went off road to left, Car/Wagon1 hit retaining wall	CAR/WAGON1, alcohol test above limit or test refused, speed entering corner/curve, too far left	Wet	Dark	Light rain	T Junction	Stop	0	0	1	0.1
1236782	HIRINI STREET		I	WAINUI ROAD	2037855	5707829	178.03181	-38.669847	2020154285	26/05/2020	Tue	14:20	Car/Wagon1 NDB on HIRINI STREET, KAITI, GISBORNE hit rear end of Car/Wagon2 stop/slow for cross traffic	CAR/WAGON1, other inattentive	Dry	Overcast	Fine	T Junction	Stop	0	0	0	0.03
1310364	HIRINI STREET		I	WAINUI ROAD	2037854	5707825	178.031808	-38.669879	2022212257	22/01/2022	Sat	13:00	SUV1 NDB on HIRINI STREET turning right hit SUV2 turning right into AXROAD		Dry	Bright sun	Fine	Crossroads	Give way	0	0	0	0.03
1240605	HIRINI STREET	35	S	WAINUI ROAD	2037847	5707802	178.031736	-38.670089	2020160738	10/06/2020	Wed	9:45	Car/Wagon1 NDB on Hirini street hit parked veh, Car/Wagon1 hit trailer	CAR/WAGON1, alcohol test above limit or test refused, too far left	Dry	Bright sun	Fine	Nil (Default)	Nil	0	0	0	0.03

1306439	HIRINI STREET	56	S	WAINUI ROAD	2037840	5707780	178.031668	-38.670294	2022222160	13/01/2022	Thu	9:08	Ute1 NDB on HIRINI STREET changing lanes to left hit Cyclist2 (Age 87)		Dry	Bright sun	Fine	Nil (Default)	Nil	0	1	0	1.13
1264785	HIRINI STREET	39	S	WAINUI ROAD	2037844	5707796	178.031706	-38.670141	2020171469	25/11/2020	Wed	2:48	Car/Wagon1 NDB on Hirini Street lost control; went off road to right	CAR/WAGON1, alcohol test above limit or test refused, too far right	Wet	Dark	Fine	Nil (Default)	Nil	0	0	0	0.03
1184303	HIRINI STREET		I	WAINUI ROAD	2037854	5707827	178.031809	-38.669863	201954333	17/01/2019	Thu	12:30	Car/Wagon1 NDB on HIRINI STREET hit rear end of Car/Wagon2 stop/slow for cross traffic	CAR/WAGON1, following too closely, other attention diverted	Dry	Bright sun	Fine	Crossroads	Stop	0	0	0	0.03
1112721	HIRINI ST		I	SH 35	2037858	5707835	178.031845	-38.669792	201717264	29/08/2017	Tue	5:38	Car/Wagon1 NDB on Hirini Street lost control but did not leave the road, Car/Wagon1 hit non specific guard rail	CAR/WAGON1, alcohol suspected, drugs suspected, medical illness (not sudden)	Dry	Twilight	Fine	T Junction	Stop	0	0	1	0.1
1152647	HIRINI ST		I	SH 35	2037858	5707835	178.031845	-38.669792	201818013	23/09/2018	Sun	5:10	Car/Wagon1 EDB on Wainui Road lost control turning right, Car/Wagon1 hit non specific cliff	CAR/WAGON1, alcohol test above limit or test refused, lost control when turning, speed entering corner/curve	Wet	Twilight	Light rain	T Junction	Stop	0	0	1	0.1
1310317	CRAWFORD ROAD	77	N	PARAU STREET	2037927	5707448	178.032878	-38.673228	2022215447	22/01/2022	Sat	21:35	Car/Wagon1 NDB on CRAWFORD ROAD hit Van2 headon on straight		Dry	Dark	Fine	Nil (Default)	Nil	0	0	0	0.03

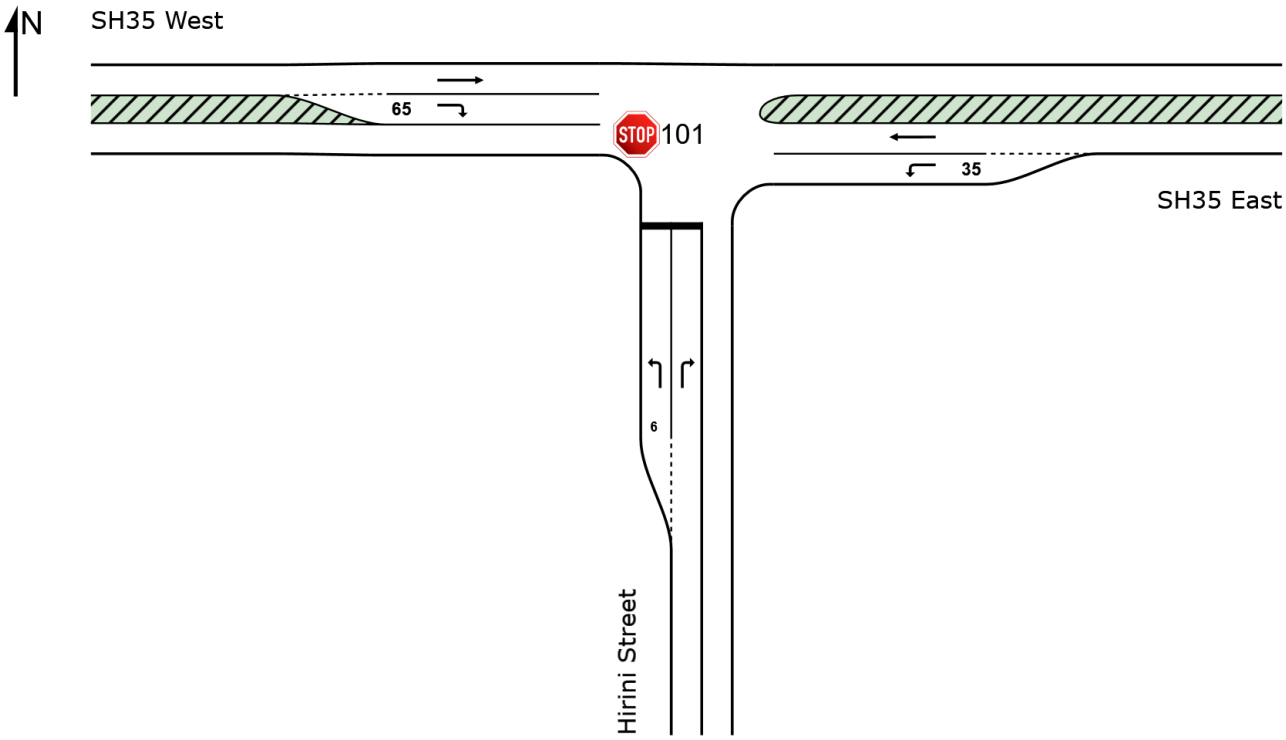
APPENDIX D – SIDRA Results (Existing Intersection)

SITE LAYOUT

Site: 101 [SH35/Hirini Street AM Survey (Site Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [SH35/Hirini Street AM Survey (Site Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	142	26	145	18.3	0.704	38.5	LOS E	3.3	26.5	0.93	1.24	1.72	33.2
3	R2	15	11	15	73.3	0.350	105.4	LOS F	1.0	11.1	0.97	1.04	1.08	20.6
Approach		157	37	160	23.6	0.704	44.9	LOS E	3.3	26.5	0.94	1.22	1.66	31.4
East: SH35 East														
4	L2	50	21	51	42.0	0.036	4.9	LOS A	0.0	0.0	0.00	0.52	0.00	46.0
5	T1	911	27	930	3.0	0.486	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	49.7
Approach		961	48	981	5.0	0.486	0.5	NA	0.0	0.0	0.00	0.03	0.00	49.5
West: SH35 West														
11	T1	566	27	578	4.8	0.307	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
12	R2	104	28	106	26.9	0.279	15.8	LOS C	1.1	9.8	0.81	0.96	0.94	40.4
Approach		670	55	684	8.2	0.307	2.5	NA	1.1	9.8	0.13	0.15	0.15	48.1
All Vehicles		1788	140	1824	7.8	0.704	5.2	NA	3.3	26.5	0.13	0.18	0.20	46.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [SH35/Hirini Street AM Operational Base (Site Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	159	34	162	21.4	1.048	135.2	LOS F	12.5	103.9	1.00	2.21	5.06	17.6
3	R2	18	14	18	77.8	1.081	420.8	LOS F	3.3	38.0	1.00	1.37	2.20	7.3
Approach		177	48	181	27.1	1.081	164.3	LOS F	12.5	103.9	1.00	2.13	4.77	15.4
East: SH35 East														
4	L2	58	27	59	46.6	0.042	5.0	LOS A	0.0	0.0	0.00	0.52	0.00	45.9
5	T1	982	29	1002	3.0	0.524	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	49.6
Approach		1040	56	1061	5.4	0.524	0.5	NA	0.0	0.0	0.00	0.03	0.00	49.4
West: SH35 West														
11	T1	610	29	622	4.8	0.331	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
12	R2	118	36	120	30.5	0.397	21.0	LOS C	1.7	14.9	0.87	1.03	1.13	38.2
Approach		728	65	743	8.9	0.397	3.5	NA	1.7	14.9	0.14	0.17	0.18	47.5
All Vehicles		1945	169	1985	8.7	1.081	16.5	NA	12.5	103.9	0.14	0.27	0.50	40.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [SH35/Hirini Street IP Survey (Site Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	114	30	123	26.3	0.260	14.9	LOS B	1.0	8.7	0.63	1.04	0.70	42.0
3	R2	19	5	20	26.3	0.127	29.5	LOS D	0.4	3.2	0.88	1.01	0.88	36.0
Approach		133	35	143	26.3	0.260	17.0	LOS C	1.0	8.7	0.66	1.04	0.72	41.0
East: SH35 East														
4	L2	33	11	35	33.3	0.024	4.9	LOS A	0.0	0.0	0.00	0.52	0.00	46.1
5	T1	513	17	552	3.3	0.289	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach		546	28	587	5.1	0.289	0.4	NA	0.0	0.0	0.00	0.03	0.00	49.6
West: SH35 West														
11	T1	697	23	749	3.3	0.396	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
12	R2	101	22	109	21.8	0.134	8.1	LOS A	0.6	4.7	0.59	0.76	0.59	44.2
Approach		798	45	858	5.6	0.396	1.2	NA	0.6	4.7	0.07	0.10	0.07	49.0
All Vehicles		1477	108	1588	7.3	0.396	2.3	NA	1.0	8.7	0.10	0.16	0.11	48.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [SH35/Hirini Street IP Operational Base (Site Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	130	39	140	30.0	0.333	17.1	LOS C	1.4	12.4	0.69	1.08	0.86	41.1
3	R2	21	6	23	28.6	0.186	38.1	LOS E	0.5	4.8	0.92	1.01	0.95	33.2
Approach		151	45	162	29.8	0.333	20.0	LOS C	1.4	12.4	0.72	1.07	0.87	39.7
East: SH35 East														
4	L2	38	14	41	36.8	0.028	4.9	LOS A	0.0	0.0	0.00	0.52	0.00	46.1
5	T1	553	18	595	3.3	0.311	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
Approach		591	32	635	5.4	0.311	0.4	NA	0.0	0.0	0.00	0.03	0.00	49.6
West: SH35 West														
11	T1	752	25	809	3.3	0.427	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	49.7
12	R2	114	29	123	25.4	0.167	8.9	LOS A	0.7	6.0	0.62	0.80	0.62	43.8
Approach		866	54	931	6.2	0.427	1.3	NA	0.7	6.0	0.08	0.11	0.08	48.9
All Vehicles		1608	131	1729	8.1	0.427	2.7	NA	1.4	12.4	0.11	0.17	0.13	48.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [SH35/Hirini Street PM Survey (Site Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	148	33	156	22.3	0.357	16.7	LOS C	1.5	12.9	0.70	1.08	0.89	41.2
3	R2	12	2	13	16.7	0.139	45.3	LOS E	0.4	3.1	0.94	1.00	0.94	31.1
Approach		160	35	168	21.9	0.357	18.8	LOS C	1.5	12.9	0.71	1.08	0.89	40.2
East: SH35 East														
4	L2	40	5	42	12.5	0.025	4.7	LOS A	0.0	0.0	0.00	0.53	0.00	46.4
5	T1	576	24	606	4.2	0.319	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
Approach		616	29	648	4.7	0.319	0.4	NA	0.0	0.0	0.00	0.03	0.00	49.6
West: SH35 West														
11	T1	934	10	983	1.1	0.512	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	49.7
12	R2	139	25	146	18.0	0.191	8.7	LOS A	0.8	6.5	0.62	0.81	0.62	44.0
Approach		1073	35	1129	3.3	0.512	1.3	NA	0.8	6.5	0.08	0.11	0.08	48.8
All Vehicles		1849	99	1946	5.4	0.512	2.5	NA	1.5	12.9	0.11	0.17	0.12	48.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [SH35/Hirini Street PM Operational Base (Site Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	166	42	175	25.3	0.455	19.6	LOS C	2.1	18.1	0.76	1.13	1.10	40.0
3	R2	14	3	15	21.4	0.253	73.3	LOS F	0.7	5.7	0.96	1.02	1.03	25.1
Approach		180	45	189	25.0	0.455	23.8	LOS C	2.1	18.1	0.78	1.12	1.09	38.2
East: SH35 East														
4	L2	44	6	46	13.6	0.027	4.7	LOS A	0.0	0.0	0.00	0.53	0.00	46.4
5	T1	621	26	654	4.2	0.344	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
Approach		665	32	700	4.8	0.344	0.4	NA	0.0	0.0	0.00	0.03	0.00	49.6
West: SH35 West														
11	T1	1006	10	1059	1.0	0.549	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	49.6
12	R2	155	32	163	20.6	0.237	9.6	LOS A	1.0	8.5	0.65	0.85	0.68	43.5
Approach		1161	42	1222	3.6	0.549	1.5	NA	1.0	8.5	0.09	0.11	0.09	48.7
All Vehicles		2006	119	2112	5.9	0.549	3.2	NA	2.1	18.1	0.12	0.18	0.15	47.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [SH35/Hirini Street AM Operational Base 6am-7am (Site Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	55	23	56	41.8	0.097	12.6	LOS B	0.3	3.3	0.49	0.98	0.49	43.1
3	R2	21	16	21	76.2	0.051	16.3	LOS C	0.2	2.0	0.60	1.02	0.60	41.3
Approach		76	39	78	51.3	0.097	13.6	LOS B	0.3	3.3	0.52	0.99	0.52	42.6
East: SH35 East														
4	L2	40	27	41	67.5	0.033	5.2	LOS A	0.0	0.0	0.00	0.52	0.00	45.7
5	T1	368	10	376	2.7	0.196	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach		408	37	416	9.1	0.196	0.6	NA	0.0	0.0	0.00	0.05	0.00	49.5
West: SH35 West														
11	T1	150	13	153	8.7	0.083	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
12	R2	50	25	51	50.0	0.060	7.6	LOS A	0.3	2.5	0.51	0.66	0.51	44.2
Approach		200	38	204	19.0	0.083	1.9	NA	0.3	2.5	0.13	0.16	0.13	48.4
All Vehicles		684	114	698	16.7	0.196	2.4	NA	0.3	3.3	0.10	0.19	0.10	48.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [SH35/Hirini Street AM Operational Base + Proposal 6am-7am (Site Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	55	23	56	41.8	0.097	12.6	LOS B	0.3	3.3	0.49	0.98	0.49	43.1
3	R2	21	16	21	76.2	0.052	16.5	LOS C	0.2	2.0	0.60	1.03	0.60	41.2
Approach		76	39	78	51.3	0.097	13.7	LOS B	0.3	3.3	0.52	0.99	0.52	42.6
East: SH35 East														
4	L2	45	27	46	60.0	0.035	5.1	LOS A	0.0	0.0	0.00	0.52	0.00	45.8
5	T1	368	10	376	2.7	0.196	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach		413	37	421	9.0	0.196	0.6	NA	0.0	0.0	0.00	0.06	0.00	49.4
West: SH35 West														
11	T1	150	13	153	8.7	0.083	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
12	R2	61	25	62	41.0	0.070	7.4	LOS A	0.3	2.8	0.51	0.66	0.51	44.4
Approach		211	38	215	18.0	0.083	2.1	NA	0.3	2.8	0.15	0.19	0.15	48.2
All Vehicles		700	114	714	16.3	0.196	2.5	NA	0.3	3.3	0.10	0.20	0.10	48.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [SH35/Hirini Street AM Operational Base + 20% HCV (Site Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	162	37	165	22.8	1.092	164.0	LOS F	15.7	131.4	1.00	2.47	5.89	15.4
3	R2	19	15	19	78.9	1.189	488.5	LOS F	4.3	50.3	1.00	1.49	2.60	6.3
Approach		181	52	185	28.7	1.189	198.1	LOS F	15.7	131.4	1.00	2.36	5.55	13.4
East: SH35 East														
4	L2	61	30	62	49.2	0.045	5.0	LOS A	0.0	0.0	0.00	0.52	0.00	45.9
5	T1	982	29	1002	3.0	0.524	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	49.6
Approach		1043	59	1064	5.7	0.524	0.5	NA	0.0	0.0	0.00	0.03	0.00	49.4
West: SH35 West														
11	T1	610	29	622	4.8	0.331	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
12	R2	122	40	124	32.8	0.426	22.2	LOS C	1.8	16.5	0.88	1.04	1.17	37.7
Approach		732	69	747	9.4	0.426	3.8	NA	1.8	16.5	0.15	0.17	0.20	47.3
All Vehicles		1956	180	1996	9.2	1.189	20.0	NA	15.7	131.4	0.15	0.30	0.59	39.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [SH35/Hirini Street PM Operational Base + 20% HCV (Site Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	174	50	183	28.7	0.492	20.7	LOS C	2.4	20.8	0.78	1.15	1.17	39.5
3	R2	15	4	16	26.7	0.306	85.8	LOS F	0.8	7.2	0.97	1.02	1.05	23.2
Approach		189	54	199	28.6	0.492	25.9	LOS D	2.4	20.8	0.80	1.14	1.16	37.4
East: SH35 East														
4	L2	45	7	47	15.6	0.028	4.7	LOS A	0.0	0.0	0.00	0.52	0.00	46.4
5	T1	621	26	654	4.2	0.344	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
Approach		666	33	701	5.0	0.344	0.4	NA	0.0	0.0	0.00	0.04	0.00	49.6
West: SH35 West														
11	T1	1006	10	1059	1.0	0.549	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	49.6
12	R2	161	38	169	23.6	0.253	9.9	LOS A	1.1	9.5	0.66	0.86	0.71	43.3
Approach		1167	48	1228	4.1	0.549	1.6	NA	1.1	9.5	0.09	0.12	0.10	48.6
All Vehicles		2022	135	2128	6.7	0.549	3.5	NA	2.4	20.8	0.13	0.19	0.17	47.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

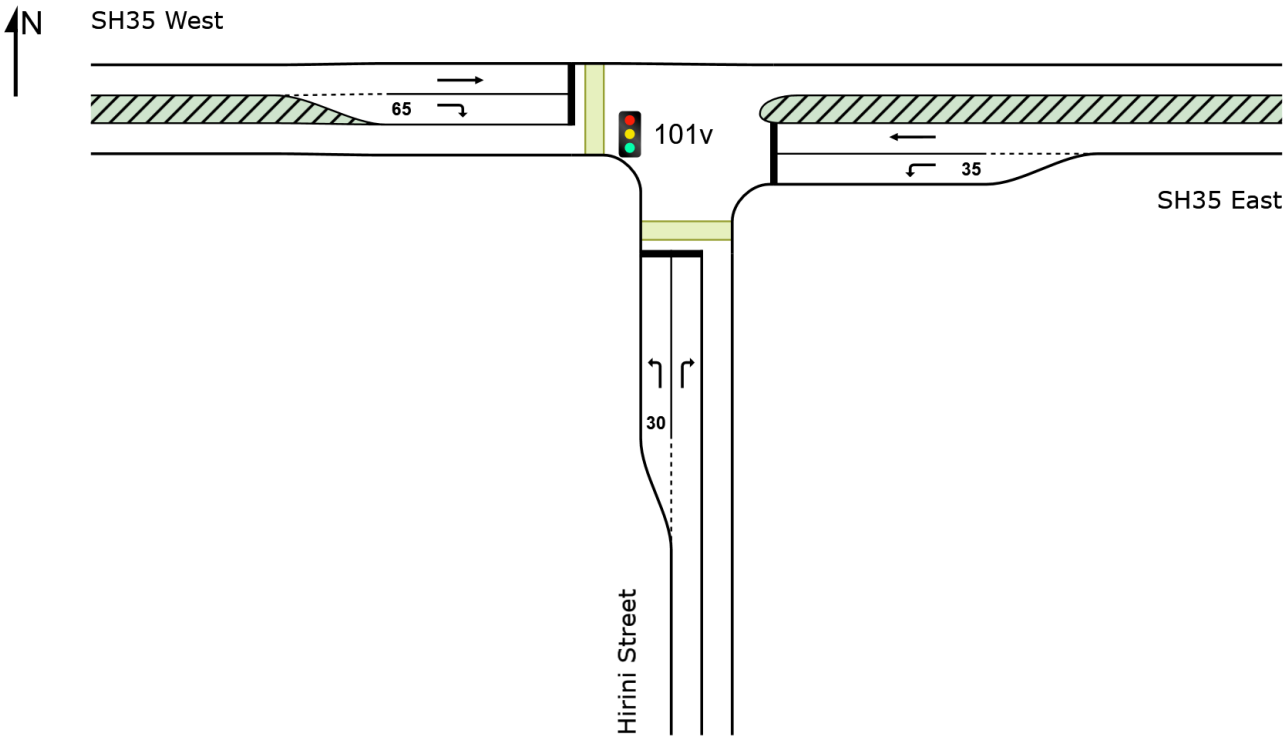
APPENDIX E – SIDRA Results (Signalised Intersection)

SITE LAYOUT

Site: 101v [SH35/Hirini Street AM Operational Base (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101v [SH35/Hirini Street AM Operational Base (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	159	34	162	21.4	0.472	48.5	LOS D	8.3	68.8	0.91	0.80	0.91	29.8
3	R2	18	14	18	77.8	* 0.184	63.9	LOS E	1.1	12.4	0.96	0.71	0.96	26.2
Approach		177	48	181	27.1	0.472	50.1	LOS D	8.3	68.8	0.92	0.79	0.92	29.4
East: SH35 East														
4	L2	58	27	59	46.6	0.053	7.4	LOS A	0.7	6.6	0.21	0.58	0.21	44.6
5	T1	982	29	1002	3.0	* 0.826	14.1	LOS B	39.3	282.2	0.74	0.69	0.74	41.9
Approach		1040	56	1061	5.4	0.826	13.7	LOS B	39.3	282.2	0.71	0.69	0.71	42.1
West: SH35 West														
11	T1	610	29	622	4.8	0.403	3.2	LOS A	9.7	70.8	0.30	0.27	0.30	47.9
12	R2	118	36	120	30.5	* 0.468	24.4	LOS C	4.6	41.0	0.85	0.80	0.85	36.9
Approach		728	65	743	8.9	0.468	6.6	LOS A	9.7	70.8	0.39	0.36	0.39	45.7
All Vehicles		1945	169	1985	8.7	0.826	14.3	LOS B	39.3	282.2	0.61	0.57	0.61	41.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Hirini Street												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.3	211.9	0.98
West: SH35 West												
P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.3	211.9	0.98
All Pedestrians		0	105	54.3	LOS E	0.2	0.2	0.95	0.95	217.3	211.9	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101v [SH35/Hirini Street AM Operational Base + 20% HCV (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	162	37	165	22.8	0.470	47.7	LOS D	8.4	70.2	0.90	0.80	0.90	30.0
3	R2	19	15	19	78.9	* 0.196	64.0	LOS E	1.1	13.2	0.96	0.71	0.96	26.2
Approach		181	52	185	28.7	0.470	49.4	LOS D	8.4	70.2	0.91	0.79	0.91	29.5
East: SH35 East														
4	L2	61	30	62	49.2	0.057	7.6	LOS A	0.7	7.4	0.22	0.58	0.22	44.5
5	T1	982	29	1002	3.0	* 0.840	15.3	LOS B	40.8	292.7	0.76	0.71	0.77	41.3
Approach		1043	59	1064	5.7	0.840	14.8	LOS B	40.8	292.7	0.73	0.71	0.74	41.5
West: SH35 West														
11	T1	610	29	622	4.8	0.403	3.2	LOS A	9.7	70.8	0.30	0.27	0.30	47.9
12	R2	122	40	124	32.8	* 0.475	25.5	LOS C	5.0	44.8	0.87	0.81	0.87	36.5
Approach		732	69	747	9.4	0.475	6.9	LOS A	9.7	70.8	0.39	0.36	0.39	45.5
All Vehicles		1956	180	1996	9.2	0.840	15.0	LOS B	40.8	292.7	0.62	0.58	0.62	41.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Hirini Street												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.3	211.9	0.98
West: SH35 West												
P4	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	217.3	211.9	0.98
All Pedestrians		0	105	54.3	LOS E	0.2	0.2	0.95	0.95	217.3	211.9	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101v [SH35/Hirini Street PM Operational Base (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	166	42	175	25.3	0.353	25.2	LOS C	4.7	40.2	0.82	0.77	0.82	36.8
3	R2	14	3	15	21.4	* 0.107	38.8	LOS D	0.5	4.1	0.95	0.69	0.95	32.2
Approach		180	45	189	25.0	0.353	26.3	LOS C	4.7	40.2	0.83	0.76	0.83	36.4
East: SH35 East														
4	L2	44	6	46	13.6	0.040	8.4	LOS A	0.5	3.9	0.34	0.61	0.34	44.3
5	T1	621	26	654	4.2	0.696	13.6	LOS B	16.6	120.6	0.80	0.71	0.80	42.1
Approach		665	32	700	4.8	0.696	13.3	LOS B	16.6	120.6	0.77	0.71	0.77	42.3
West: SH35 West														
11	T1	1006	10	1059	1.0	* 0.822	8.9	LOS A	23.6	166.8	0.62	0.62	0.68	44.6
12	R2	155	32	163	20.6	0.368	13.3	LOS B	2.5	20.7	0.74	0.75	0.74	41.6
Approach		1161	42	1222	3.6	0.822	9.5	LOS A	23.6	166.8	0.63	0.64	0.68	44.1
All Vehicles		2006	119	2112	5.9	0.822	12.3	LOS B	23.6	166.8	0.69	0.67	0.72	42.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Hirini Street												
P1	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	192.3	211.9	1.10
West: SH35 West												
P4	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	192.3	211.9	1.10
All Pedestrians		0	105	29.3	LOS C	0.1	0.1	0.92	0.92	192.3	211.9	1.10

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101v [SH35/Hirini Street PM Operational Base + 20% HCV (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	174	50	183	28.7	0.362	24.6	LOS C	4.9	42.6	0.81	0.77	0.81	37.0
3	R2	15	4	16	26.7	* 0.118	39.0	LOS D	0.5	4.6	0.95	0.69	0.95	32.2
Approach		189	54	199	28.6	0.362	25.7	LOS C	4.9	42.6	0.82	0.76	0.82	36.5
East: SH35 East														
4	L2	45	7	47	15.6	0.042	8.8	LOS A	0.5	4.3	0.35	0.61	0.35	44.1
5	T1	621	26	654	4.2	* 0.718	14.6	LOS B	17.3	125.1	0.82	0.74	0.83	41.6
Approach		666	33	701	5.0	0.718	14.2	LOS B	17.3	125.1	0.79	0.73	0.79	41.8
West: SH35 West														
11	T1	1006	10	1059	1.0	0.826	9.3	LOS A	24.0	169.5	0.62	0.62	0.68	44.3
12	R2	161	38	169	23.6	* 0.379	13.9	LOS B	2.7	23.0	0.76	0.76	0.76	41.3
Approach		1167	48	1228	4.1	0.826	10.0	LOS A	24.0	169.5	0.64	0.64	0.69	43.9
All Vehicles		2022	135	2128	6.7	0.826	12.8	LOS B	24.0	169.5	0.70	0.68	0.74	42.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Hirini Street												
P1	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	192.3	211.9	1.10
West: SH35 West												
P4	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	192.3	211.9	1.10
All Pedestrians		0	105	29.3	LOS C	0.1	0.1	0.92	0.92	192.3	211.9	1.10

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

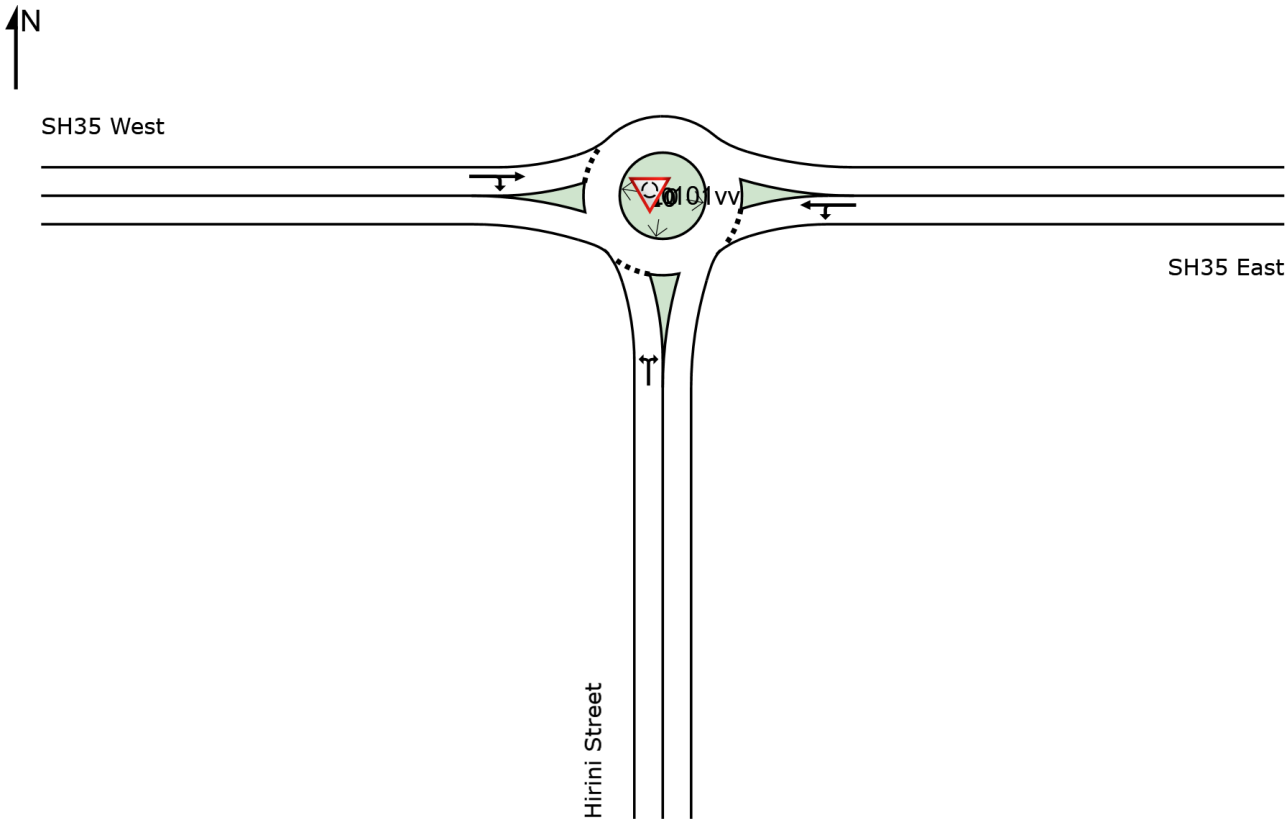
APPENDIX F – SIDRA Results (Roundabout Intersection)

SITE LAYOUT

Site: 101vv [SH35/Hirini Street AM Operational Base (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101vv [SH35/Hirini Street AM Operational Base (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	159	34	162	21.4	0.662	32.3	LOS C	6.3	54.0	1.00	1.22	1.49	34.1
3	R2	18	14	18	77.8	0.662	41.9	LOS D	6.3	54.0	1.00	1.22	1.49	33.9
Approach		177	48	181	27.1	0.662	33.3	LOS C	6.3	54.0	1.00	1.22	1.49	34.0
East: SH35 East														
4	L2	58	27	59	46.6	0.856	8.9	LOS A	16.2	118.9	0.95	0.64	0.99	43.9
5	T1	982	29	1002	3.0	0.856	7.4	LOS A	16.2	118.9	0.95	0.64	0.99	45.1
Approach		1040	56	1061	5.4	0.856	7.5	LOS A	16.2	118.9	0.95	0.64	0.99	45.1
West: SH35 West														
11	T1	610	29	622	4.8	0.502	3.9	LOS A	6.0	44.9	0.26	0.42	0.26	47.0
12	R2	118	36	120	30.5	0.502	7.5	LOS A	6.0	44.9	0.26	0.42	0.26	46.4
Approach		728	65	743	8.9	0.502	4.4	LOS A	6.0	44.9	0.26	0.42	0.26	46.9
All Vehicles		1945	169	1985	8.7	0.856	8.7	LOS A	16.2	118.9	0.70	0.61	0.76	44.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101vv [SH35/Hirini Street AM Operational Base + 20% HCV (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	162	37	165	22.8	0.706	36.6	LOS D	6.9	60.4	1.00	1.26	1.58	32.7
3	R2	19	15	19	78.9	0.706	46.2	LOS D	6.9	60.4	1.00	1.26	1.58	32.6
Approach		181	52	185	28.7	0.706	37.6	LOS D	6.9	60.4	1.00	1.26	1.58	32.7
East: SH35 East														
4	L2	61	30	62	49.2	0.868	10.1	LOS B	17.9	131.1	0.99	0.68	1.07	43.7
5	T1	982	29	1002	3.0	0.868	8.4	LOS A	17.9	131.1	0.99	0.68	1.07	45.0
Approach		1043	59	1064	5.7	0.868	8.5	LOS A	17.9	131.1	0.99	0.68	1.07	44.9
West: SH35 West														
11	T1	610	29	622	4.8	0.509	3.9	LOS A	6.1	45.9	0.27	0.42	0.27	47.0
12	R2	122	40	124	32.8	0.509	7.5	LOS A	6.1	45.9	0.27	0.42	0.27	46.3
Approach		732	69	747	9.4	0.509	4.5	LOS A	6.1	45.9	0.27	0.42	0.27	46.8
All Vehicles		1956	180	1996	9.2	0.868	9.7	LOS A	17.9	131.1	0.72	0.64	0.81	44.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101vv [SH35/Hirini Street PM Operational Base (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	166	42	175	25.3	0.358	10.6	LOS B	2.4	20.6	0.86	0.90	0.86	42.9
3	R2	14	3	15	21.4	0.358	13.8	LOS B	2.4	20.6	0.86	0.90	0.86	43.5
Approach		180	45	189	25.0	0.358	10.8	LOS B	2.4	20.6	0.86	0.90	0.86	43.0
East: SH35 East														
4	L2	44	6	46	13.6	0.614	5.9	LOS A	6.1	44.4	0.67	0.59	0.67	45.1
5	T1	621	26	654	4.2	0.614	5.7	LOS A	6.1	44.4	0.67	0.59	0.67	46.0
Approach		665	32	700	4.8	0.614	5.7	LOS A	6.1	44.4	0.67	0.59	0.67	45.9
West: SH35 West														
11	T1	1006	10	1059	1.0	0.764	3.9	LOS A	16.6	120.1	0.32	0.39	0.32	46.8
12	R2	155	32	163	20.6	0.764	7.4	LOS A	16.6	120.1	0.32	0.39	0.32	46.4
Approach		1161	42	1222	3.6	0.764	4.3	LOS A	16.6	120.1	0.32	0.39	0.32	46.8
All Vehicles		2006	119	2112	5.9	0.764	5.4	LOS A	16.6	120.1	0.49	0.50	0.49	46.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101vv [SH35/Hirini Street PM Operational Base +20% HCV (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Hirini Street														
1	L2	174	50	183	28.7	0.387	11.2	LOS B	2.7	23.5	0.87	0.93	0.90	42.6
3	R2	15	4	16	26.7	0.387	14.5	LOS B	2.7	23.5	0.87	0.93	0.90	43.1
Approach		189	54	199	28.6	0.387	11.5	LOS B	2.7	23.5	0.87	0.93	0.90	42.6
East: SH35 East														
4	L2	45	7	47	15.6	0.624	6.1	LOS A	6.3	45.6	0.69	0.60	0.69	45.0
5	T1	621	26	654	4.2	0.624	5.8	LOS A	6.3	45.6	0.69	0.60	0.69	45.9
Approach		666	33	701	5.0	0.624	5.8	LOS A	6.3	45.6	0.69	0.60	0.69	45.8
West: SH35 West														
11	T1	1006	10	1059	1.0	0.774	3.9	LOS A	17.4	126.1	0.35	0.39	0.35	46.8
12	R2	161	38	169	23.6	0.774	7.5	LOS A	17.4	126.1	0.35	0.39	0.35	46.2
Approach		1167	48	1228	4.1	0.774	4.4	LOS A	17.4	126.1	0.35	0.39	0.35	46.7
All Vehicles		2022	135	2128	6.7	0.774	5.5	LOS A	17.4	126.1	0.51	0.51	0.52	46.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX G – SIDRA Level of Service Criteria

Table 5.14.1

Delay (SIDRA) method for Level of Service definitions based on delay only (for vehicles)

Level of Service	Control delay per vehicle in seconds (d)		
	Signals	"SIDRA Roundabout LOS" method (1)	Sign Control
A	d ≤ 10	d ≤ 10	d ≤ 10
B	10 < d ≤ 20	10 < d ≤ 20	10 < d ≤ 15
C	20 < d ≤ 35	20 < d ≤ 35	15 < d ≤ 25
D	35 < d ≤ **55**	35 < d ≤ **50**	25 < d ≤ **35**
E	**55** < d ≤ 80	**50** < d ≤ 70	**35** < d ≤ 50
F	80 < d	70 < d	50 < d

For Standard Left, Standard Right and New Zealand setups in SIDRA INTERSECTION, this is the default LOS Method for vehicles. Level of Service Target = LOS D is indicated by the table.

(1) The default *Roundabout LOS Method* is the ***SIDRA Roundabout LOS*** method for roundabouts which is unique to SIDRA INTERSECTION. It has been recommended by AUSTROADS - AGTM03-20, Guide to Traffic Management Part 3: Transport Study and Analysis Methods (2020), Table 7.3.

Source: SIDRA User Guide, October 2020