PROPOSED WHARF AND DREDGING PROJECT

RESOURCE CONSENT APPLICATIONS: VOLUME 3

SPECIALIST REPORTS: APPENDIX M - R

PREPARED FOR PORT OF NAPIER LTD

NOVEMBER 2017





Allan Planning & Research Ltd

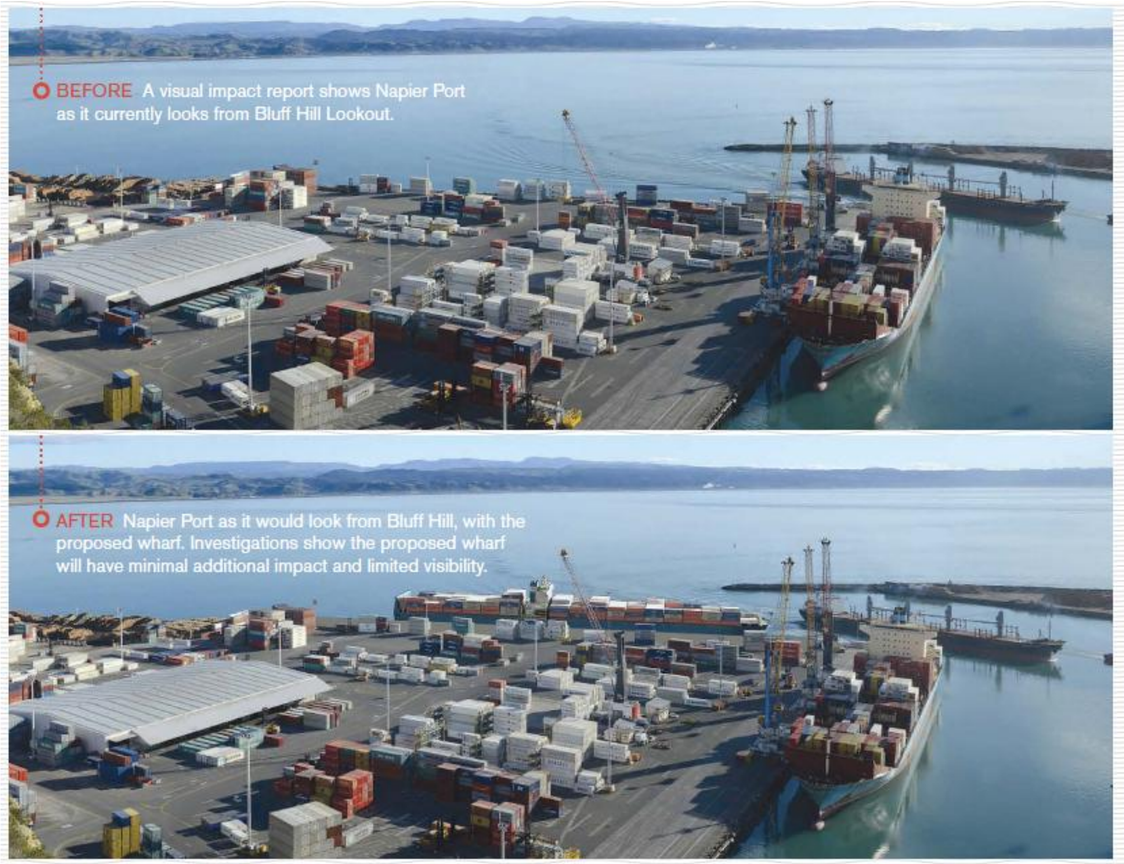
Stantec

APPENDIX M

NAPIER PORT TRAFFIC IMPACT ASSESSMENT

NAPIER PORT

Napier Port Proposed New Wharf and Dredging Project



Traffic Impact Assessment

for Stantec New Zealand Ltd
(formerly MWH New Zealand)

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FINAL
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A	12/5/2017	Final Draft	David Wanty	Sylvia Allan	

This report has been prepared in accordance with a specific agreement with Stantec New Zealand (formerly MWH New Zealand). The reliance by other parties on the information or opinions contained in this report shall without our prior review and agreement in writing, be at such party's sole risk. In preparing this report reliance has been made on written and verbal advice of parties involved. Wanty Transportation Consultancy Ltd has not necessarily independently verified all information and is not endorsing all information as to its accuracy. This report does not constitute legal advice or opinion.

Executive Summary

MWH now part of Stantec were requested to provide a Traffic Impact Assessment (TIA) to understand the traffic effects of the proposed construction of a new wharf (number 6) facility at Napier Port with associated dredging.

The new wharf number 6 will be approximately 350 metres in length. No “reclamation” is involved and it is proposed that the concrete working surface of the wharf will be constructed on top of new concrete piles driven into the seabed.

Traffic surveys and localised modelling were completed to identify any traffic issues that may affect the performance of the immediately surrounding road network prior to construction, during construction and when the new wharf is operating.

Projected traffic growth based on Napier Port’s operational forecasts has also been assessed and modelled to advise on the future capacity of the Port’s intersections with State Highway 50 (SH50) Breakwater Road, initially for a ten year design frame (2027) and with design life testing for a 30 year horizon.

The investigations have concluded that there will be minor reductions in the operational level of service for traffic using the Western Port entrance during the construction period. The levels of service at this location based on traffic surveys in July 2016 are very good and will remain good or very good throughout the construction period and into the medium to long term based on predicted growth at the Port arising from the proposed wharf development. Accordingly the existing Port access intersections on SH50 can continue to operate with satisfactory capacity for the medium to long term.

In terms of safety there are some concerns around the interaction of heavy vehicles with pedestrians/cyclists at the Western access. In addition the proximity of the rail line results in heavy vehicles short stacking both over the rail line and onto the state highway. Some minor improvements have been recommended as part of a recent safety review of the intersection, however should this problem remain then a longer term solution may need to be investigated, such as signalisation.

TRAFFIC IMPACT ASSESSMENT

Napier Port Proposed New Wharf and Dredging Project

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Part 1 – BACKGROUND INFORMATION

1 Introduction

Napier Port is located at the northeast corner of Bluff Hill in Napier, Hawkes Bay.

Napier Port's assets are becoming insufficient to meet the Port's needs in the immediate short-term future as well as in the longer term. This is due to growing trade and the pressures for larger vessels for the shipping industry. Hawke's Bay is seeing substantial investment in new export ventures and regional infrastructure projects that will continue to see export freight grow. Maintaining and increasing peak season capacity is critical to the long term success of the Port's business.

Longer term, the Port will need to invest in wharf capacity and additional cargo-handling equipment, as well as supporting services such as logistics and ship schedules and planning, in order to provide the level of productivity that customers demand and more importantly the ability to handle the volume required over the peak months.

The trend toward larger vessels (longer, wider and deeper) will continue at a faster pace than in the previous 25 years. This is already evident with larger vessels aiming to visit New Zealand ports over the next decade. Coupled with the high number of cruise vessel visitors per annum, this industry can continue to grow only if Napier Port has increased berth capacity at the scale required.

Accordingly Napier Port proposes to expand and upgrade its facilities to meet the increased demand. The new wharf number 6 is Napier Port's first priority. This has been designed to accommodate larger vessels in the future, including the berth pocket of the maximum 14.5 m depth that is eventually likely to be required, and will allow for more large vessels visiting the Port simultaneously. As needed, the swinging basin, fairway and approach channel will be progressively deepened and widened. In the case of the channel, this will involve capital dredging in a location hitherto unaffected by dredging.

The development at Napier Port will meet the region's current and future growth projections and is a critical strategic asset for the wider Hawke's Bay and lower North Island customers and communities

Napier Port plans to seek resource consents for its phased dredging programme and the subsequent disposal of dredge material, andl to build one new berth within its existing operational footprint at the northern end of the container terminal. This will be long enough (350 metres) and deep enough to handle larger vessels and will require the dredging of a berth pocket and swing basin. This may require the Port to deepen and extend the shipping channel in stages from its current consented maximum of 12.8 metres to 14.5 metres. Figure 1-1 shows a summary of the proposed changes.

This traffic impact assessment has been prepared to assess the impact of the Port's proposal on Napier City Council's (NCC) and the New Zealand Transport Agency's (NZTA) transport network.

The Port's eastern (southern) access is Gate 1, which is the main non-containerised cargo entrance to the Port. It is reserved mainly for inbound and outbound fertiliser and logging trucks together with traffic (mainly shuttle buses to and from Napier's "iSite") associated with cruise ships. The access extends east and then runs parallel to Marine Parade and Napier beach before obtaining access via the Port's security entrance.

Gate 2 is permanently locked and not in current use.

Gate 3 is the main container cargo entrance is also the Port security entrance and is located at the western edge of the existing port operational area on Breakwater Road/State Highway 50.
A separated access to the Main Office and Administration Buildings at the Gate 3 provides access to the main Port operational area. As these buildings are located on port land yet outside of the port operational areas, access and security is safer and easier for visitors to the Port.

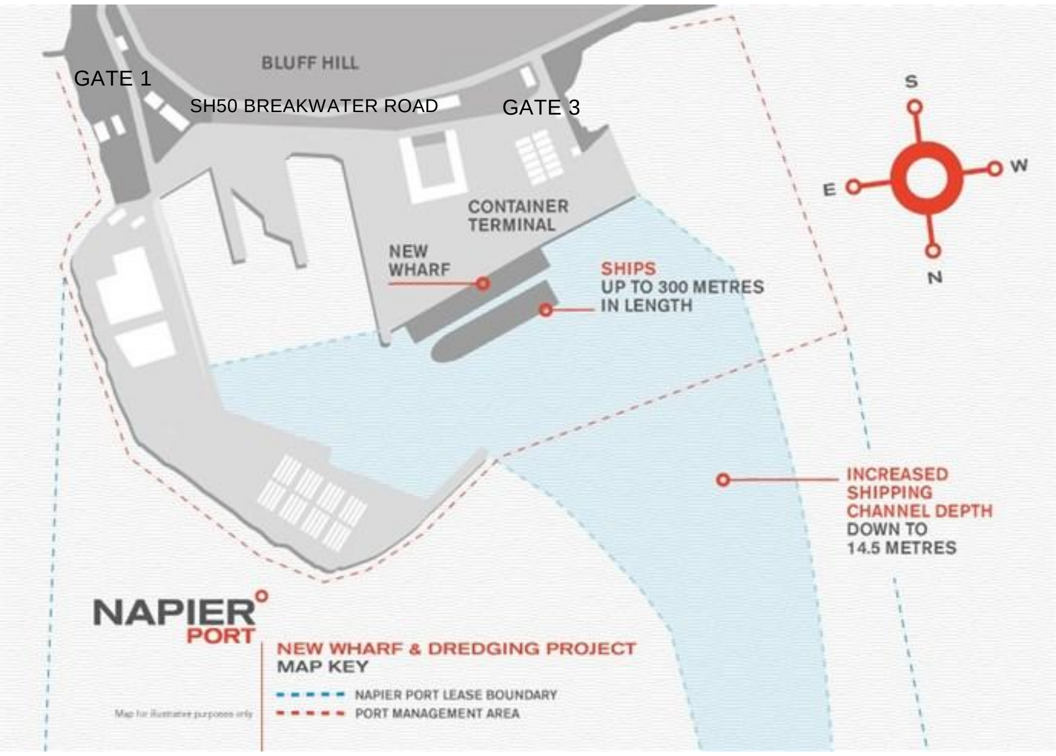

Figure 1-1: Proposed Wharf and Dredging Project

In terms of existing public bus services there are none that currently travel along Breakwater Road past the Port. The nearest bus route is 15 servicing Bay View, Westshore and Ahuriri. The inbound service travels along Hardinge Road and onto Shakespeare Road while the outbound route leaves the Napier Bus Terminus along Shakespeare Road turning left into Battery Road. The service runs approximately every hour weekday daytime and Saturday daytime every two hours. The distance from the Shakespeare Road/ Battery Road intersection to the Western Gate is approximately 0.4 km.

All goBay buses are fitted with bike racks that can carry up to two bikes at one time and are free and easy to use, thus enabling some Port workers to bike from the Bus Terminus to the Port[1].

2 Current Operational Environment

Both of Napier Port's main traffic gateways are currently Give Way controlled "T" intersections with SH 50 Breakwater Road. There is also a storage facility accessed from SH50 between the road and Bluff Hill. The storage facility is used intermittently when required and has not been assessed as part of this study due to the already highly controlled use of this site.

The layout of the western Port access intersection with Breakwater Road was re-designed, with construction completed, during 2014. This has provided additional inbound and outbound lanes, primarily for heavy vehicle movements and also serves as the main access for the Port's Office accommodation and associated car parking for staff and visitors.

[1] The distance from the library to the Western Gate is approximately 2.7 km and to the Eastern Gate approximately 1.0 km. The distance from the Customs Quay / Bridge Street rotary to the Western Gate is approximately 1.4 km.

Figure 2-1: Western access (Source: NCC GIS, 2015 aerial)

A new vehicle booking system has been incorporated into the Port layout, which has significantly reduced congestion at the Port entrance.

Figure 2-2: Driver using the vehicle booking system

While the Western access intersection with SH50 is in NZTA road reserve, it is understood that Napier City Council is responsible for the parking and shared path, while KiwiRail operates the single rail track corridor between SH 50 and the PortThe rail corridor ends just to the north of the eastern (southern access) shown in the figure below.

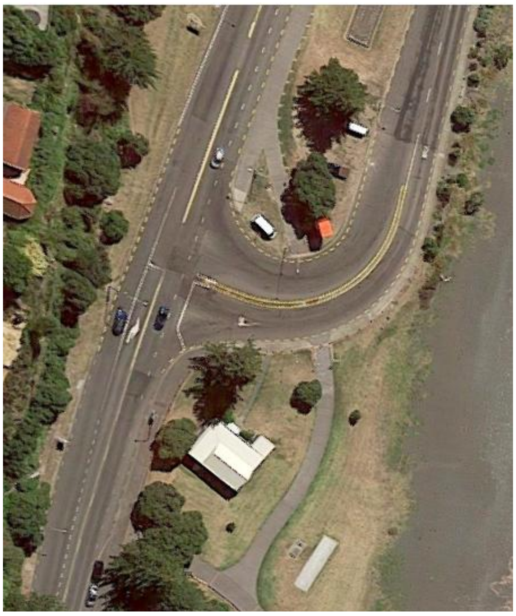

Figure 2-3: Eastern access (Source: NCC GIS, 2015 aerial)

The map included as Appendix A shows the road network in the Napier area where the majority of Port related heavy vehicle traffic is accommodated.

Container storage facilities situated within the Onekawa and Pandora Industrial Areas generate truck movements between these sites and the Port's western gate; SH50 and Prebensen Drive provide the main routes for these related trips.

Port traffic to/from SH2 and SH5 north and west of Bayview is via SH2 to Westshore Bridge and West and Customs Quays linking to SH 50.

Port traffic to/from SH2 south of Hastings is via the SH50A Hawkes Bay Expressway and SH50 passing through the 3 leg roundabout at the intersection of SH2 Pandora Road and SH50 Hyderabad Road.

Port traffic to/from Napier CBD is generally via Marine Parade.

The rail corridor accesses the Port from Ahuriri and the north. In the vicinity of the Port, the rail runs parallel to the Ahuriri Bypass and Chatham Street before crossing Breakwater Road/SH 50 where it then runs more or less parallel to the Port on the seaward side of Breakwater Road. The rail corridor passes Gate 3 before terminating adjacent to the Port's security entrance for road vehicles by Gate 1.

A shared cycle and pedestrian pathway extends for the entire length of the rail corridor along the SH50 Breakwater Road reserve; it continues along the short southern non-state highway portion of Breakwater Road south of the Eastern Access. Users of the shared pathway are required to give way to all traffic entering and exiting the Port.

3 Associated Transportation Networks

Napier Port is connected to the National State Highway network by SH50, which has been upgraded in the past to provide an effective route for heavy vehicles to avoid having to travel through residential areas. Appendix A provides an overview of existing road connections for the Port.

Marine Parade between the Port's Eastern gate and SH2 is managed by Napier City Council and is currently the only non-State Highway used regularly by trucks to and from the Port.

A rail spur from the line between Palmerston North and Gisborne provides rail access for the Port. Prior to the impact on CentrePort of the Kaikoura earthquakes in November 2016 there were in the region of 8 train movements per day, with approximately double that number since. The Napier to Gisborne rail line north of Wairoa is currently not operational and resurrection of the service does not appear likely in the short to medium term. Therefore this report focusses on road based traffic demands and forecasts.

Napier's cycling and walking network provides direct links from the Ahuriri and Napier CBDs to the Port. While buses do not currently run along Breakwater Road they can carry two bicycles free of charge; bus route 15 also passes through the Shakespeare Road/Battery Road intersection near to the eastern gate.

4 Road Safety

4.1 Crash History

NZTA's Crash Analysis System (CAS) was used to evaluate the trends in Police reported crashes for the past six calendar years, noting some non-injury crashes for the last 3-4 months of 2016 might not have been recorded at time of accessing CAS (late April 2017).

The crashes on the 3.66 km route comprising SH50 east of SH2 are provided in the table below. The coded crash list is provided in Appendix C along with some other crash tables.

The serious crash involved a motorcyclist losing control; four minor injury and three non-injury crashes were also lost control crashes. Two minor-injury and five non-injury crashes involved crossing or turning at an intersection (particular the Lever Street crossroads). One minor-injury and five non-injury crashes involved a rear end crash or hitting a parked vehicle at or within 30 metres of an intersection. One non-injury crash involved changing lanes.

Table 4-1: SH50 crashes east of Pandora Road (RS 0)

Year	Fatal	Serious	Minor	Non-Injury	Total
2011			3	3	6
2012			1	1	2
2013			0	1	1
2014			0	3	3
2015			2	3	5
2016		1	1	3	5

There have been no vehicle crashes reported in the six calendar years 2011 to 2016 along Breakwater Road south (local road portion) between Coote Road and the eastern Port entrance (start of SH50). There was however one non-injury crash on 4 July 2014 that occurred at the eastern Port entrance involving a car colliding misjudging/not noticing the intentions of a truck swinging wide to turn left into the Port[2].

None of the crashes occurred at the Port western access indicating that there are no safety concerns at the intersection per se. There have been no injury crashes associated with trucks along Breakwater Road and SH 50 east of SH 2 Pandora Road so generally there are no safety concerns with trucks along the SH 50 and Breakwater Road route.

The crash history reveals that there have been no injury crashes associated with trucks along Breakwater Road and SH 50 east of SH 2 Pandora Road.

With respect to non-Police reported crashes recorded in CAS in the same period, none occurred along the same route (start RS 0 of SH50).

Accordingly based on the crash history there is no reason that any additional light or heavy traffic to the Port (or rail associated movements) will adversely impact on road safety.

4.2 Western access safety

While the intersection with SH50 has been performing satisfactorily, there are nevertheless safety concerns in the current arrangement. These relate particularly to the shared pathway and the short stacking length between the rail track and the intersection. Following site visits in February and March 2017, concerns were listed in April 2017 in a memo report to Napier Port by MWH, now part of Stantec NZ (refer to Appendix D).

A number of mitigation measures were suggested in relation to the pedestrian/cyclist facility which are being addressed. One issue related also to 4-5 parking spaces within the Port being available to the public with motorists sometimes being confused as to how then to exit the Port. The recommendation was to consider restricting the public from using these spaces given the nearby ample parking adjacent to the State Highway.

However the issue of short stacking, which is a matter principally affecting the NZTA and KiwiRail, requires discussion between the parties. One mitigation option could be to signalise the intersection while incorporating the train movements in the traffic signal controller settings, which is done at a number of signalised intersections including Elizabeth Street by the Waikanae train station. This should better suit the shared pathway arrangement as well, noting that trucks exiting the Port might not only encroach over the rail track while waiting to exit but also block the route used by pedestrians and cyclists who might instead be tempted to walk/cycle along the road.

[2] This crash (ID 201440103) should have been recorded as being at SH 50 RP 0/0 and not solely as Breakwater Road (local road).

5 Traffic Surveys

Video data collection comprising turning movements by vehicle class including cyclists and pedestrians using MioVision video detection and processing was undertaken for Wednesday 10 August 2016 (from midnight to midnight) at both the western and eastern gates.

The peak hour flows for the AM and PM peak periods plus the midday peak period are given in Appendix B. These reveal that the peak hour during the day was the 2:45-3:45 pm period.

The highest number of cyclists in any 15 minute period was 2, while the highest number of pedestrians in any 15 minute period was 9 (12:15-12:30 pm).

The NZTA published AADT for the dual loop station 05000001 at RP 0/1.42 between Battery Road and western Gate 1 for 2015 is approximately 5285 vehicles per day with 14 percent heavy vehicles (HV). By comparison the 2015 AADTs along SH 2 were 8140 (4% HV) at the Westshore Bridge (Pandora Road north of West Quay), and 14,805 (7% HV) just south of the Pandora Road / SH 50 Hyderabad Road roundabout (RS 649). These values (given to nearest 5 vpd) were based on 29-32 days valid observed data, presumed to be four 7-8 day surveys during the year. The 2016 values were unavailable at time of writing (mid-late April 2017).

The surveyed motor vehicle flows closely match those recorded at the NZTA station during late May 2016, which as shown in the figure below has typical flows representing most months of the year aside from the peak February/March period.

The figures below shows the pattern of traffic along SH 50 Breakwater Road just west of Gate 3 for the past four years, using the NZTA TMS report procedure Draw Flow Graph.

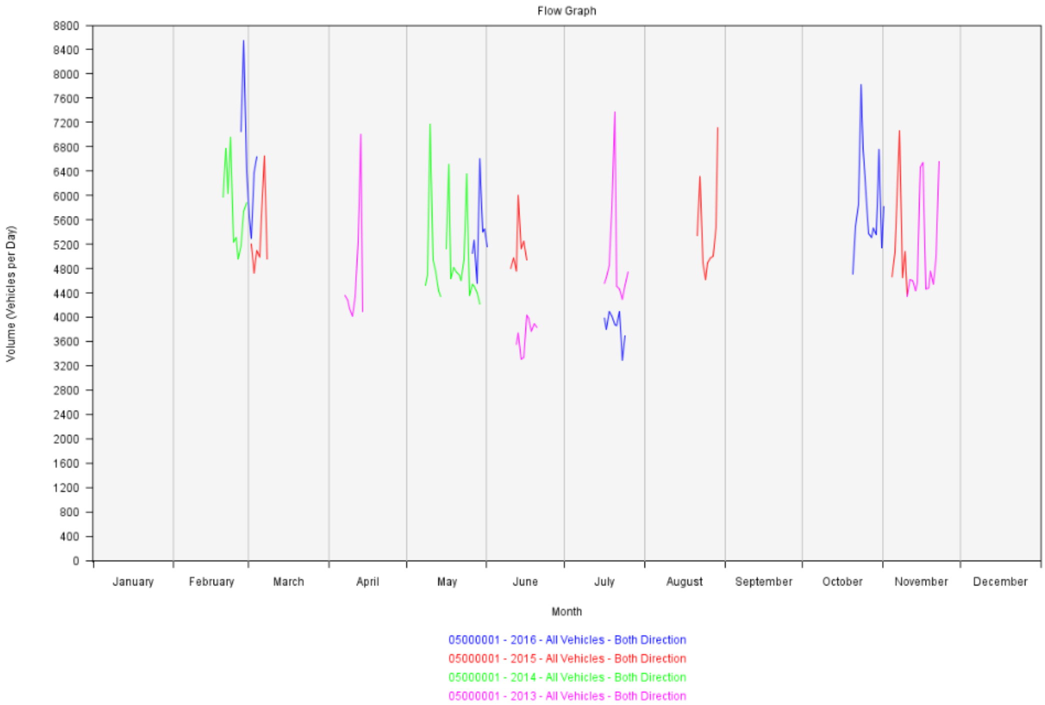

Figure 5-1: SH50 Breakwater Road west daily two-way flows, 2013-2016

TMS was also used to derive the quarter / hourly flow profile for the May 2016 week, the graphs of which are included in Appendix E.

They reveal that Friday afternoon flows were slightly higher (higher westbound through flows) than for the average Monday to Thursday, while the (light) vehicle movements along Breakwater Road were highest on Sunday when Port traffic is low (only a few trucks per hour recorded all day). The average weekday peak number of trucks per hour during the daytime was approximately 120 per hour or approximately one truck in each direction per minute.

The appended graphs support selection of the Wednesday mid-afternoon peak period as the analysis basis for coincidence of peak Port traffic with passing through traffic along SH50 Breakwater Road.

6 Current Traffic Generation

The current traffic turning flows observed during the weekday peak hour entering and exiting the Port are given pictorially in Figure 6-1 and tabulated in Table 6-1 and Table 6-2.

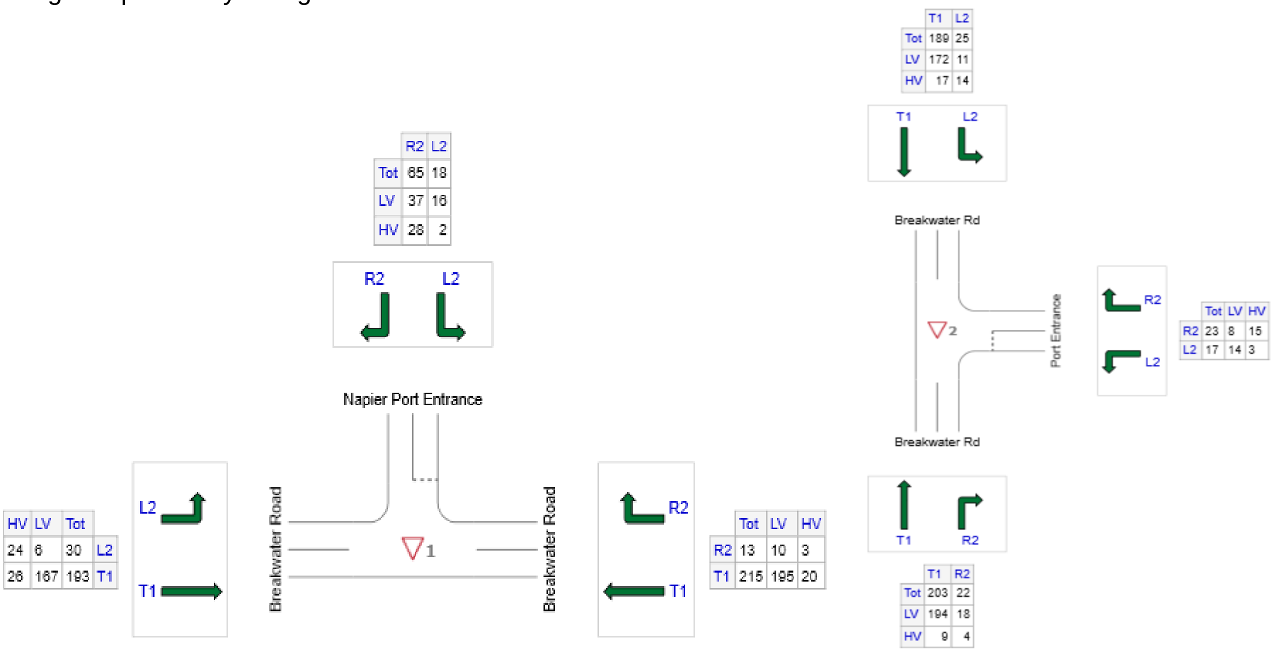

Figure 6-1: Surveyed peak hour turning movement flows

Table 6-1: Surveyed peak hour flows: Western Access

	Breakwater Rd (W)				Napier Port				Breakwater Rd (E)				West Entrance	
	East Bound				South Bound				West Bound				entering intersection	
Time (PM)	L (all)	L (HV)	T (all)	T (HV)	R (all)	R (HV)	L (all)	L (HV)	R (all)	R (HV)	T (all)	T (HV)	Total (all)	Total (HV)
2.45 - 3.00	7	6	49	3	17	13	1	0	5	1	56	9	135	32
3.00 - 3.15	10	7	38	8	14	8	1	0	1	0	55	6	119	29
3.15 - 3.30	10	8	53	7	17	2	7	0	4	0	50	2	141	19
3.30 - 3.45	3	3	53	8	17	5	9	2	3	2	54	3	139	23
Total	30	24	193	26	65	28	18	2	13	3	215	20	534	103

Table 6-2: Surveyed peak hour flows: Eastern Access

	Breakwater Rd (N)				Napier Port				Breakwater Rd (S)				East Entrance	
	South Bound				West Bound				North Bound				entering intersection	
Time (PM)	T (all)	T (HV)	L (all)	L (HV)	L (all)	L (HV)	R (all)	R (HV)	T (all)	T (HV)	R (all)	R (HV)	Total (all)	Total (HV)
2.45 - 3.00	48	2	6	2	7	1	9	5	54	5	3	1	127	16
3.00 - 3.15	36	6	5	3	2	0	5	4	45	1	5	1	98	15
3.15 - 3.30	45	3	7	3	6	1	3	3	53	0	5	1	119	11
3.30 - 3.45	60	6	7	6	2	1	6	3	51	3	9	1	135	20
Total	189	17	25	14	17	3	23	15	203	9	22	4	479	62

These show that the through (T) traffic past both entrances in each direction is fairly constant being generally in the range 190 to 200 vehicles per hour (vph) with a slightly higher 215 vph westbound flow past the western Port access. The number of vehicles entering the entrances is approximately 45 vph (43 to 47) with 40 vph exiting the Eastern gate and 83 vph exiting the Western Gate, giving an overall total of 213 vph entering/exiting the two entrances. Assuming no movements occur between the gates, the majority of Port traffic is to/from the "west" (143 vph) rather than to/from Marine Parade (70 vph).

7 Current Intersection Performance

The traffic count data from the video survey's recorded peak hour (14:45 to 15:45) has been analysed using a SIDRA (version 7.0.7) traffic model, applying the standard default values in the first instance. The outputs are given in Appendix F.

From the Port's records, there is a peak operating turnover and associated vehicle movements during March and April each year at the Port. To assess this peak time of the year the video counts for all vehicle classes for each turn, including through movements on Breakwater Road, were increased by 15% reflecting the observed seasonal flow patterns along SH50. The movement summary results are provided in the tables below.

Table 7-1: Current peak flows intersection performance: Western Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Breakwater Road											
5	T1	260	9.3	0.142	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
6	R2	16	23.1	0.017	3.7	LOS A	0.1	0.5	0.39	0.45	29.6
Approach		276	10.1	0.142	0.2	NA	0.1	0.5	0.02	0.03	48.8
North: Napier Port Entrance											
7	L2	22	11.1	0.022	3.1	LOS A	0.1	0.6	0.33	0.41	40.9
9	R2	79	43.1	0.220	11.0	LOS B	0.9	8.2	0.66	0.78	35.4
Approach		100	36.1	0.220	9.3	LOS A	0.9	8.2	0.59	0.70	36.5
West: Breakwater Road											
10	L2	36	80.0	0.031	5.3	LOS A	0.0	0.0	0.00	0.51	41.3
11	T1	234	13.5	0.130	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		270	22.4	0.130	0.7	NA	0.0	0.0	0.00	0.07	49.1
All Vehicles		646	19.3	0.220	1.8	NA	0.9	8.2	0.10	0.15	47.3

Table 7-2: Current peak flows intersection performance: Eastern Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Breakwater Rd											
2	T1	259	4.4	0.137	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
3	R2	28	18.2	0.029	6.2	LOS A	0.1	0.9	0.39	0.57	35.8
Approach		288	5.8	0.137	0.6	NA	0.1	0.9	0.04	0.06	48.1
East: Port Entrance											
4	L2	22	17.6	0.023	3.2	LOS A	0.1	0.6	0.34	0.41	35.7
6	R2	29	65.2	0.098	12.4	LOS B	0.4	3.8	0.66	0.78	32.4
Approach		51	45.0	0.098	8.5	LOS A	0.4	3.8	0.52	0.62	33.7
North: Breakwater Rd											
7	L2	32	56.0	0.024	5.1	LOS A	0.0	0.0	0.00	0.52	45.8
8	T1	242	9.0	0.131	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		273	14.5	0.131	0.6	NA	0.0	0.0	0.00	0.06	49.5
All Vehicles		612	12.9	0.137	1.3	NA	0.4	3.8	0.06	0.11	47.0

The results indicate that the current peak hour level of service at the peak time of the year for each movement is LOS A or B, that is the control (queuing plus geometric) delay averages less than 15 seconds per vehicle. The "maximum" expected queues are only one vehicle.

8 Conclusion

It is concluded that the existing Port access SH50 intersections are operating safely and with a higher level of performance that, as shown in the next Parts of this traffic assessment, should allow for their continued satisfactory use in the expanded development of the Port.

Part 2 – WHARF CONSTRUCTION

1 Introduction

The Wharf Construction Methodology report by Beca provides one possible methodology and sequence adopted by the selected Contractor. Wharf construction is likely to take approximately 18 to 24 months in total.

> *A construction area will be established for the contractor adjacent to the wharf site. This will be fenced off to separate construction activities from port operations, possibly with a line of empty containers. Access to the site will be through the western gate and a defined route from the gate to the site will be established.*
>
> *There will be a large number of truck deliveries to site during the construction. The most concentrated number of deliveries will be during major [wharf] deck pours, when 5 to 8 concrete trucks will arrive every hour over a period of 4 to 6 hours. This will be additive to the number of trucks carrying containers that enter the port daily.*
>
> *It is anticipated that some materials, most significantly the pipe for the piles, will be delivered by ship directly to the port. This may also apply to some other materials such as rebar.*

The above is mainly associated with the construction of the concrete deck for the expanded wharf. At less concentrated times there will be dump trucks operating; the report states

> *The armour rock will be delivered to the backhoe in dump trucks. The source of the armour rock is not known, and it may be delivered to the port either by road or by barge.*

The report also states

> *The number of truck movements required for the revetment work will add further truck movements accessing the Port. Adopting an 18 month construction period and allowing for 25.3 blocks being trucked to site per day equates to 11,826 block units to be delivered to site, 6 days per week for 78 weeks. This equates to approximately 486 construction days. The number of truck movements is estimated to be 5 trucks per day, equating to 10 truck movements, conservatively carrying 5 blocks per day (that is 1-2 truck movements per hour). The timing of the delivery of the units is likely to coincide with the wharf deck construction sequence (including the timing of the piles being driven into the seabed).*

Figure 1-1: Transporter carrying 6 block units

Some other trucks might be expected from time to time, for example delivering welding equipment. There will likely be the occasional transporter to the site, for example transporting a loader or digger.

Once the wharf structure is complete, the pavement area along the south edge of the wharf will be re-graded to 'tie-in' and match the elevation of the wharf deck, involving standard asphalting machinery.

Staff engaged to work on the wharf development project will mainly arrive in light vehicles as at present.

Potentially the Contractors might provide vans or minibuses to and from designated parking areas away from the Port. Start and ends of construction shifts are not expected to coincide with the existing peak Port traffic time during mid-afternoon. For example workers supporting the construction of the concrete deck when concrete trucks are arriving will continue to work well after the last concrete trucks have left.

As at present not all workers will take private vehicles to work on site and many of those that do may car pool during their engagement period.

Some workers could be expected to take advantage of the shared pedestrian/cyclist pathway that follows the Port railway line providing convenient access to the Port on a flat route from central Napier and the Marine Parade foreshore.

2 Expected Traffic Generation

This section of the report will look specifically at the additional traffic generated by the construction work.

Below are the vehicle types, movements and maximum numbers included into the Construction Phase peak hour (14.45 to 15.45) model for the Port's western access. All traffic movements related to the construction of the new wharf will enter and exit the Port via the Western Gate.

Right Turn into the Port	5 Cars, 5 Light Vans and 8 Concrete Trucks
Left Turn into the Port	5 Cars, 5 Light Vans and 8 Concrete Trucks
Right Turn from the Port	5 Cars, 5 Light Vans and 8 Concrete Trucks
Left Turn from the Port	5 Cars, 5 Light Vans and 8 Concrete Trucks

The approach and departure directions for the Concrete Trucks are only assumed at the moment as the Contractors are yet to be confirmed. Because of this uncertainty, the modelled figures have allowed for 8 Concrete Trucks inbound and outbound for both directions on Breakwater Road. In addition, a number of associated light vehicle movements have also been included. These additional traffic movements are above the 8 concrete truck movements per hour in total that has been estimated in the construction methodology to provide additional confidence in the intersection's ability to manage the extra traffic.

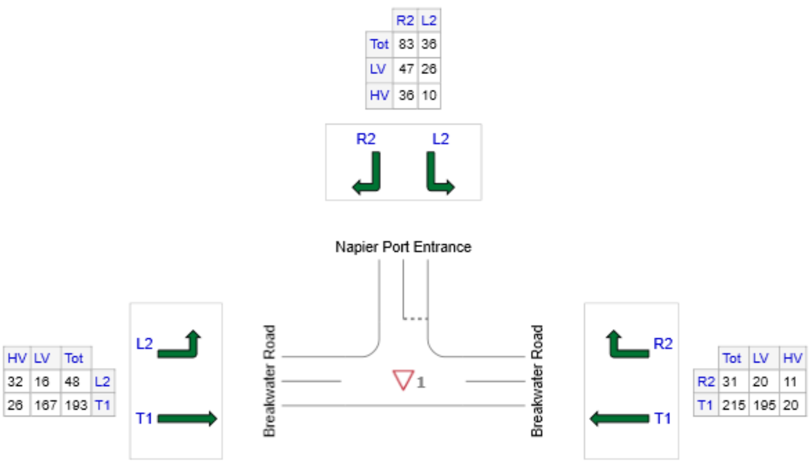

Figure 2-1: Modelled construction turning movement flows: Western Access

3 Traffic Impact on Port western access

The performance of the intersection based on the surveyed flows with the additional construction traffic added is given in Appendix E.

To reflect however that construction may occur during a busier time of the year, all of the above flows, conservatively including the user input 72 vph construction traffic, were factored by 10 per cent (and also 50% for a design life assessment), for which the performance of the intersection is given below.

Table 3-1: Design Life assessment with construction plus additional 10% flows: Western Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Breakwater Road											
5	T1	249	9.3	0.135	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
6	R2	36	35.5	0.042	6.7	LOS A	0.2	1.5	0.42	0.60	40.6
Approach		285	12.6	0.135	0.9	NA	0.2	1.5	0.05	0.08	49.1
North: Napier Port Entrance											
7	L2	42	27.8	0.046	3.3	LOS A	0.2	1.4	0.34	0.43	40.6
9	R2	96	43.4	0.275	12.1	LOS B	1.2	11.1	0.68	0.84	34.8
Approach		138	38.7	0.275	9.5	LOS A	1.2	11.1	0.58	0.72	36.4
West: Breakwater Road											
10	L2	56	66.7	0.044	5.2	LOS A	0.0	0.0	0.00	0.52	41.8
11	T1	223	13.5	0.125	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		279	24.1	0.125	1.0	NA	0.0	0.0	0.00	0.10	48.7
All Vehicles		702	22.3	0.275	2.6	NA	1.2	11.1	0.14	0.21	46.7

Table 3-2: Design Life assessment with construction plus additional 50% flows: Western Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Breakwater Road											
5	T1	334	9.3	0.182	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
6	R2	48	35.5	0.066	7.7	LOS A	0.3	2.3	0.49	0.67	39.9
Approach		382	12.6	0.182	1.0	NA	0.3	2.3	0.06	0.08	49.0
North: Napier Port Entrance											
7	L2	56	27.8	0.069	3.9	LOS A	0.2	2.1	0.41	0.49	40.2
9	R2	129	43.4	0.546	25.0	LOS C	2.7	26.2	0.86	1.17	29.0
Approach		185	38.7	0.546	18.6	LOS C	2.7	26.2	0.72	0.97	31.6
West: Breakwater Road											
10	L2	75	66.7	0.059	5.2	LOS A	0.0	0.0	0.00	0.52	41.8
11	T1	300	13.5	0.167	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		375	24.1	0.167	1.0	NA	0.0	0.0	0.00	0.10	48.7
All Vehicles		942	22.3	0.546	4.5	NA	2.7	26.2	0.17	0.27	45.5

The assessment of the western access intersection performance reveals that its performance with the additional construction traffic is still level of service B at worse. Even applying a high 50% to the input flows, with peak flow factor changed to 96.5% to reflect minor peak spreading, the worst level of service is C for the right turn out of the Port.

Accordingly it is assessed that the intersection can adequately cope with additional construction activity traffic associated with the proposed wharf.

4 Wider Traffic Impact

The proposed development generally only directly affects the western access, with heavy construction traffic limited to use of the western access. Even if some traffic (for example worker shuttle van) were to use the Port eastern access it can easily satisfactorily accommodate additional traffic in a likewise manner for the western access.

In terms of the wider highway network, the effect of construction traffic on the state highway network (SH50 and SH2 in particular) will be expected to be managed in the usual manner via a temporary traffic management plan(s) prepared nearer to the time of construction activity.

However, the NZTA is currently upgrading critical intersections, a Government initiative announced in late July 2016 partly in anticipation of the Port's development proposal; refer to Part 3.

5 Temporary Traffic Management

Within the wharf there will likely be put in place temporary traffic management (TTM) during the construction period and especially during key periods such as the concrete deck construction. When engaging the Contractor, the Port will no doubt include conditions to ensure the safe operation of the Contractors staff and equipment over and above OSH requirements.

No external TTM measures are expected to be needed aside from standard procedures applying to over-dimensioned vehicles such as a large digger being transported or a crane.

It can be expected that there would be some coordination by the Port of concrete truck activity with rail movements to/from the Port but occasional rail movements are unlikely to affect construction traffic to any great extent.

As noted above, as standard practice a temporary traffic management plan(s) will be developed nearer to the time of construction activity, which also includes managing construction traffic on the local highway network to/from the Port.

6 Conclusion and Recommendation

It is concluded that the existing western Port Gate 1 intersection should be able to operate satisfactorily with additional construction traffic.

As is standard practice it is recommended that the Port of Napier requires that the Contractor prepare and submit a construction traffic management plan for both external and internal operations, identifying also interaction with Port rail and other activities.

Part 3 – POST CONSTRUCTION

1 Introduction

This section of the report will look at the ongoing operations, once the wharf is constructed and the associated traffic generation.

It should be noted that the effect of the recent constraints placed on CentrePort, for a period believed to be up to two years, which have resulted in a significant increase in Napier Port road and rail traffic (equivalent to a few years anticipated growth) are assumed to be of short-term effect only but nevertheless can be considered to demonstrate the need for the Port's proposed new wharf.

2 Past and Projected Port Traffic

Past growth from 2006 to 2015 and previous projected growth from 2016 to 2025 are given in the figure overleaf for total tonnage and twenty-foot equivalent containers (TEU) handled at the Port.
For the 2009 to 2015 calendar years the peak month and annual TEU are tabulated below[3].

Table 2-1: Annual and peak month TEU

Year	Total TEU	Peak TEU	Peak month	Peak % total TEU
2009	166,934	23,415	April	14.0
2010	180,871	24,583	April	13.6
2011	188,081	24,634	March	13.1
2012	204,065	26,793	March	13.1
2013	206,272	25,470	March	12.4
2014	220,048	31,922	March	14.5
2015	256,438	27,557	April	10.7
2016	257,380			

The busiest months for the container terminal serviced by Gate 3 are February/March to May inclusive, with at least one month reaching or exceeding 60% utilisation.

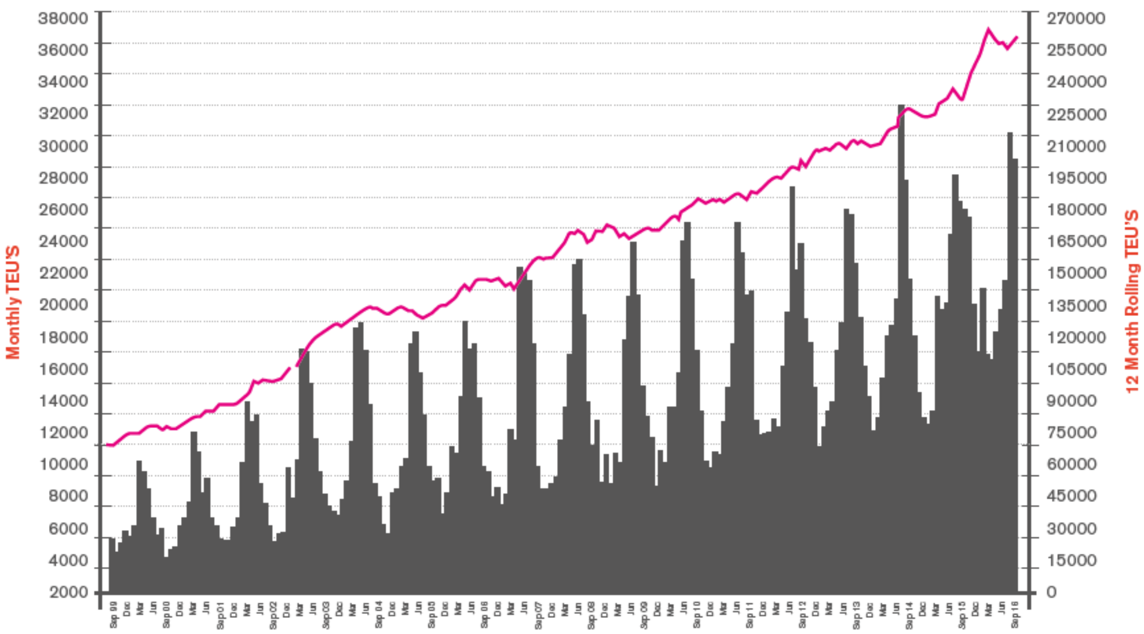

Figure 2-1: Historical monthly and rolling 12 month TEU

3 These values were provided by the Port of Napier and differ slightly from the MoT Freight Information Gathering System (FIGS) data available on http://www.transport.govt.nz/sea/figs/ such as Port TEU and Land TEU.

In May 2016 it was reported that April 2016 was the busiest April ever (28,513 TEU), off the back of a busy March where monthly volumes were the second highest on record. Furthermore it was reported that log volumes were forecast to increase from 1.1 million tonnes to around 2.4 million tonnes by 2025.

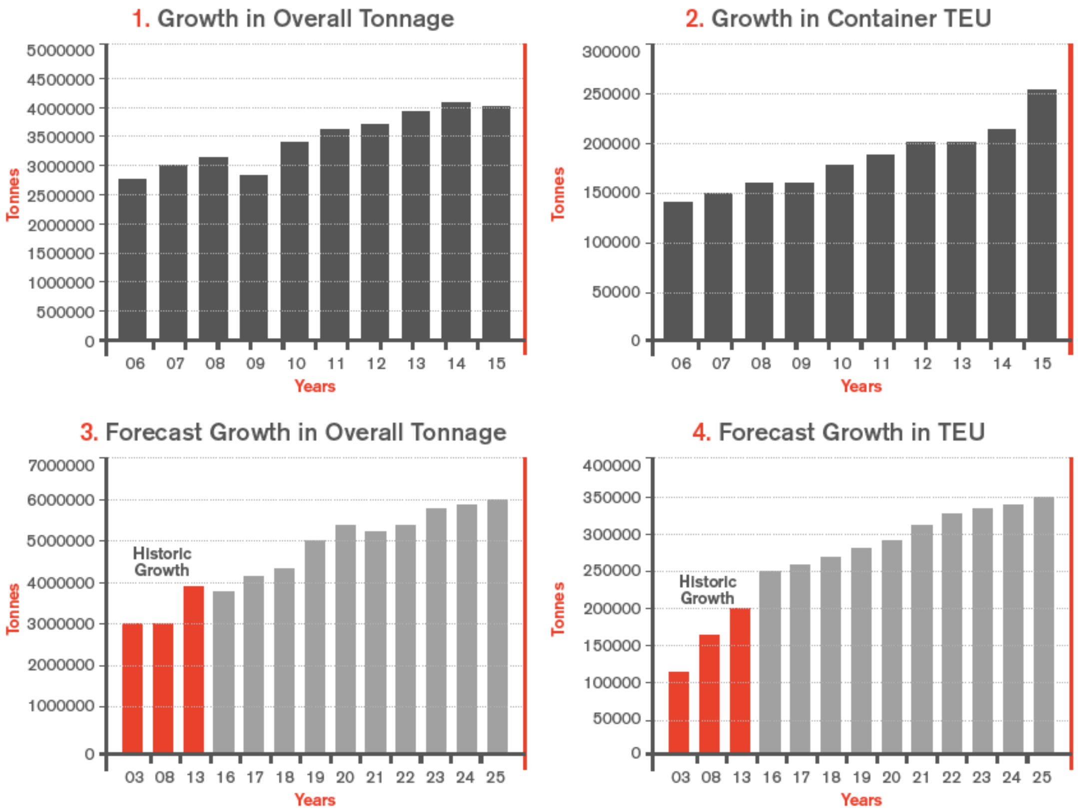

Figure 2-2: Historical and Forecast annual overall tonnage and container TEU

In addition within 5-10 years it is expected that Oasis class cruise ships will be operating within Australasia, which will in practice be able to berth at Napier once the new longer wharf is developed. Presently Napier is the gateway for up to 140,000 cruise vessel visitors per annum, with the number of cruise vessels increasing since 2007/08 to 2011/12 but constrained more recently by existing operations. The proposed development could attract another 4-5 vessels and upwards of 15,000–20,000 visitors per year.

The current operational limit for container wharf 5 is estimated as 300,000 TEU per annum which equates to a monthly limit of 42,000 when applying a peak month factor of 14%. This limit is projected to be reached by 2021 on a business-as-usual basis. Based on the forecast increase of 100,000 TEU from 2016 to 2025, the projected TEU for 2027 is approximately 372,000 TEU[4]. This is equivalent to a 48.9 % increase over the 2016 base value or a linear growth rate of approximately 4.4 % with respect to 2016.

The projected growth rate in log traffic is higher at approximately 13%, noting however that larger loads might be permissible for carrying by logging trucks and potentially a greater proportion could be transported by rail. Logging trucks typically enter and exit the Port via Gate 1.

3 Traffic Impact on Port Western access

To assess the effect of future port traffic it has been assumed that the same proportionate rate will apply as was presently observed for the 2:45-3:45 pm peak hour. Initially the 2016 through traffic flows past western Gate 3 were factored by 20% to reflect the busier autumn period and to allow for a small amount of background traffic growth, while the flows into and out of the Port were factored by 60%.

[4] The 2016 Annual Report forecast for 2026 lists 360,000 containers TEU along with 3.7, 2.8, and 0.5 million tonnes bulk cargo, log volume, and wood pulp respectively, plus 60 cruise ship calls.

These represent the projected flows for 2027 (taken as 10 years growth) with the proposed new wharf, for which the delay for the traffic turning out of the Port was assessed as less than 14 seconds (LOS B), with similar performance to that of the construction traffic.

Table 3-1: Projected 2027 design flows intersection performance: Western Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Breakwater Road											
5	T1	272	9.3	0.148	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
6	R2	22	23.1	0.025	3.9	LOS A	0.1	0.8	0.41	0.47	29.5
Approach		293	10.3	0.148	0.3	NA	0.1	0.8	0.03	0.04	48.4
North: Napier Port Entrance											
7	L2	30	11.1	0.031	3.2	LOS A	0.1	0.8	0.34	0.42	40.9
9	R2	109	43.1	0.329	13.7	LOS B	1.5	14.0	0.72	0.91	34.0
Approach		140	36.1	0.329	11.4	LOS B	1.5	14.0	0.63	0.80	35.3
West: Breakwater Road											
10	L2	51	80.0	0.043	5.3	LOS A	0.0	0.0	0.00	0.51	41.3
11	T1	244	13.5	0.136	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		294	24.9	0.136	0.9	NA	0.0	0.0	0.00	0.09	48.8
All Vehicles		728	21.2	0.329	2.7	NA	1.5	14.0	0.13	0.20	46.3

Table 3-2: Design Life assessment: Western Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Breakwater Road											
5	T1	323	9.3	0.176	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
6	R2	32	23.1	0.039	4.5	LOS A	0.1	1.2	0.47	0.53	29.3
Approach		354	10.5	0.176	0.4	NA	0.1	1.2	0.04	0.05	48.1
North: Napier Port Entrance											
7	L2	44	11.1	0.048	3.5	LOS A	0.2	1.3	0.38	0.46	40.8
9	R2	158	43.1	0.611	25.0	LOS C	3.4	33.0	0.86	1.26	29.0
Approach		202	36.1	0.611	20.3	LOS C	3.4	33.0	0.76	1.09	30.9
West: Breakwater Road											
10	L2	73	80.0	0.062	5.3	LOS A	0.0	0.0	0.00	0.51	41.3
11	T1	290	13.5	0.162	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		363	26.9	0.162	1.1	NA	0.0	0.0	0.00	0.10	48.6
All Vehicles		919	22.6	0.611	5.1	NA	3.4	33.0	0.18	0.30	44.5

A design life assessment was undertaken in a similar manner to that reported above for the construction traffic. The results given above equate to an equivalent of 30 years growth. Once again the right turn out of the Port continued to operate with LOS C; its maximum queue has increased from 1½ vehicles to around 3½ vehicles and which can still be satisfactorily accommodated by the existing layout.

These indicate that the existing intersection can operate satisfactorily for the long term from a capacity perspective, following construction of the expanded wharf and expected growth in Port traffic.

However as noted earlier, should safety concerns remain at the Western access in relation to heavy vehicles, rail and pedestrians/cyclists then signalisation may need to be considered. Preliminary investigation of a signalisation option (refer Appendix F) reveals indicatively that it could satisfactorily operate for the long term with a short cycle time and worse movement LOS C, with single through lanes and a protected right turn into the Port[5].

4 Traffic Impact on Port Eastern access

For comparison purposes a design life assessment was made for the eastern access in the same manner as for the western access, as shown in Table 4-1 below.

The results as compared to the surveyed 2:45-3:45 pm peak, relate to 45% additional through traffic and 135% additional traffic in/out of the Port. This shows that all movements continue to operate satisfactorily and slightly better than for the western access.

[5] Right turn arrows provided so the right turn in can be controlled when a train is operating.

Table 4-1: Design Life assessment: Eastern Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Breakwater Rd											
2	T1	310	4.4	0.163	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
3	R2	54	18.2	0.063	6.8	LOS A	0.2	2.0	0.45	0.63	35.6
Approach		364	6.5	0.163	1.0	NA	0.2	2.0	0.07	0.09	47.1
East: Port Entrance											
4	L2	42	17.6	0.048	3.5	LOS A	0.2	1.3	0.38	0.46	35.7
6	R2	57	65.2	0.260	19.8	LOS C	1.0	10.8	0.79	0.92	30.4
Approach		99	45.0	0.260	12.9	LOS B	1.0	10.8	0.61	0.72	32.4
North: Breakwater Rd											
7	L2	62	56.0	0.047	5.1	LOS A	0.0	0.0	0.00	0.52	45.8
8	T1	288	9.0	0.157	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		350	17.3	0.157	0.9	NA	0.0	0.0	0.00	0.09	49.2
All Vehicles		814	15.8	0.260	2.4	NA	1.0	10.8	0.10	0.17	45.4

5 Wider Traffic Impact

In terms of the wider highway network, the effect of increased Port traffic on the state highway network (SH50 and SH2 in particular) has not been assessed at this stage. The NZTA is charged by Government to support its Government Policy Statement on Land Transport (GPS) and the key GPS strategic priority is economic growth and productivity which is directly relevant to the proposed Port development.

In late July 2016 the Government announced a $25 million package of three road access improvements to Napier port as one of the first actions of Matariki - the Hawke's Bay Economic Development Strategy. The road improvement package includes improvements to intersections at Watchman Road (work has already commenced) and Hyderabad Road/Prebensen Drive as well as the SH50/SH2 Expressway. Accordingly it is expected that the Transport Agency will continue to maintain and oversee the local state highway network in the medium to long term such that it operates satisfactorily with the demands placed by current and future road users. The same likewise applies to Napier City Council responsible for the local road network.

Similarly it is expected that any increase in rail transport to/from the Port arising from the proposed development can be satisfactorily managed by the rail operator with oversight by the rail owner. Note that as reported in the MoT FIGS, the TEU by road and rail in or out of the Port gates showed a decline for rail for the 2015 calendar year both in total TEU and as a percentage of the road TEU.

Table 5-1: Port road and rail TEU (source: MoT FIGS)

Year	Total Road TEU	Total Rail TEU	Rail as % Road TEU
2012	139,980	26,840	19.2
2013	166,321	31,439	18.9
2014	227,066	47,622	21.0
2015	281,880	33,044	11.7
2016	n/a	n/a	n/a

6 Conclusion and Recommendations

It is concluded that the existing Port access intersections should continue to operate satisfactorily from a capacity perspective with the development of the Port. In terms of safety, minor improvements have been recommended at the Western access as part of a recent safety review, however should this problem remain then a longer term solution may need to be investigated, such as signalisation.

It is expected that the impact on the wider network of the Port operations, vital to the regional economy, will continue to be monitored and if need be addressed by road improvements, such as the three state highway projects announced by the Government in mid 2016 which have already been commenced by the Transport Agency. It is recommended to continue to review such needs in light of changing circumstances, such as the Kaikoura earthquake impact on competing CentrePort and changes to the Wairoa to Gisborne rail corridor for example, as well as the continual change in the maritime sector.

Appendix A Napier network

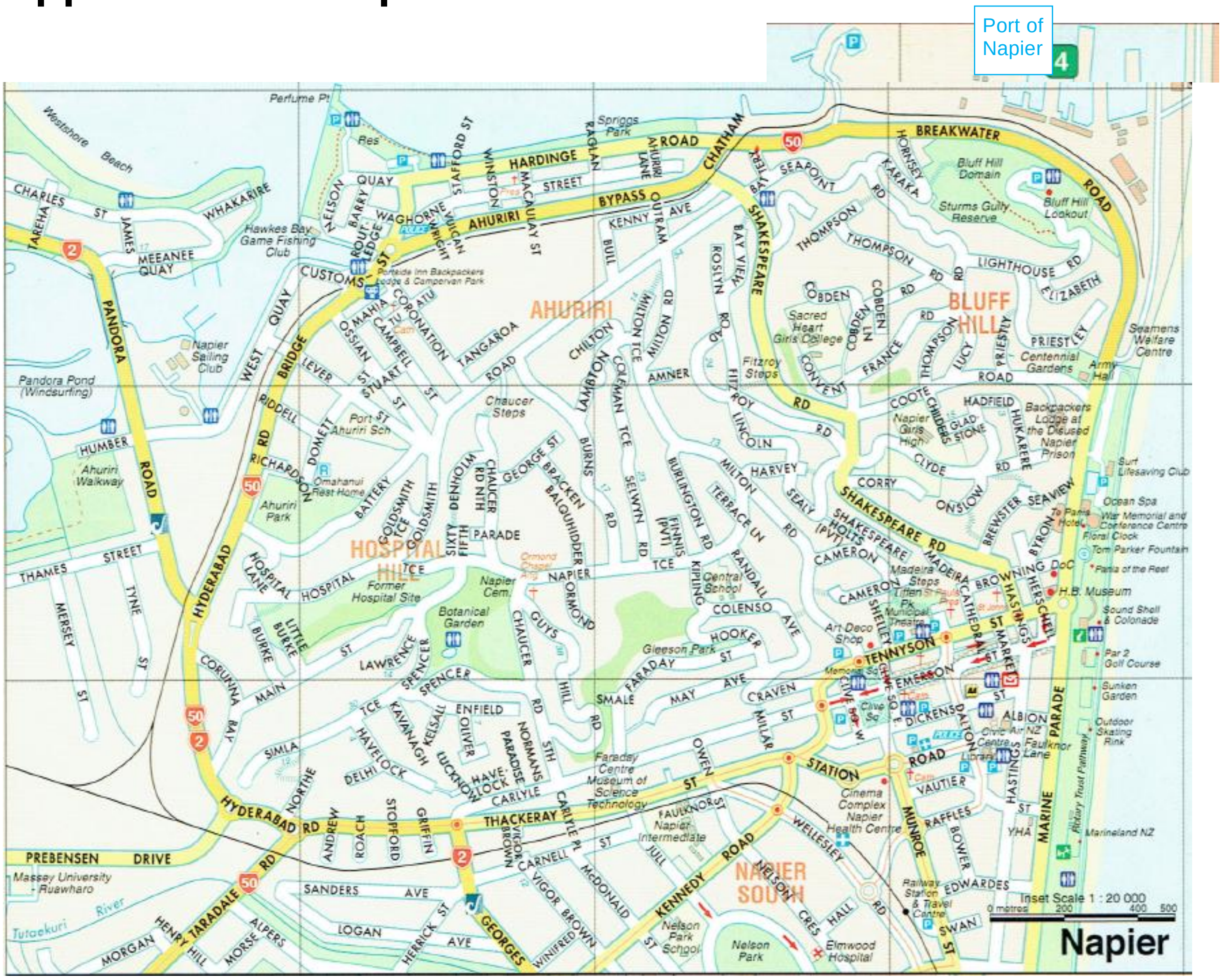

Figure A-1: Road network (Source: KiwiMaps North Island Provincial City & Towns 6th edition)

Western Access Gate 3 Eastern Access Gate 1

Figure A-2: Western and Eastern Accesses (Source: Google Aerial)

Appendix B AM & PM and midday peak hour flows

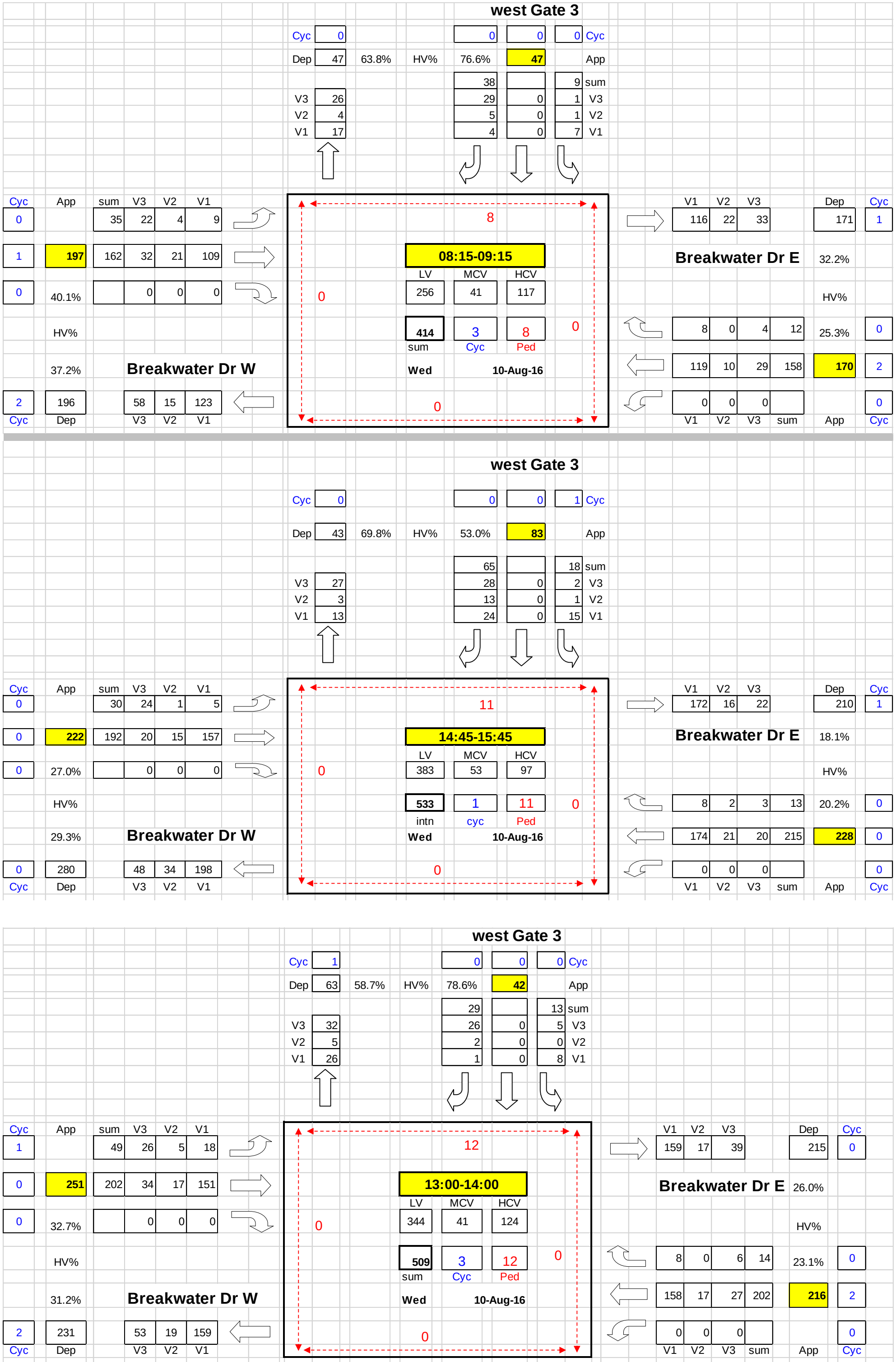

Figure D-1: Western Access surveyed peak hourly flows

LV comprises cars and m/c; MCV comprises LGV and Buses; HCV comprises trucks with/out trailers

Pedestrian flows were presumably only surveyed where they crossed the Port entrance; cyclists were surveyed on road but not along the shared pathway crossing the Port entrance.

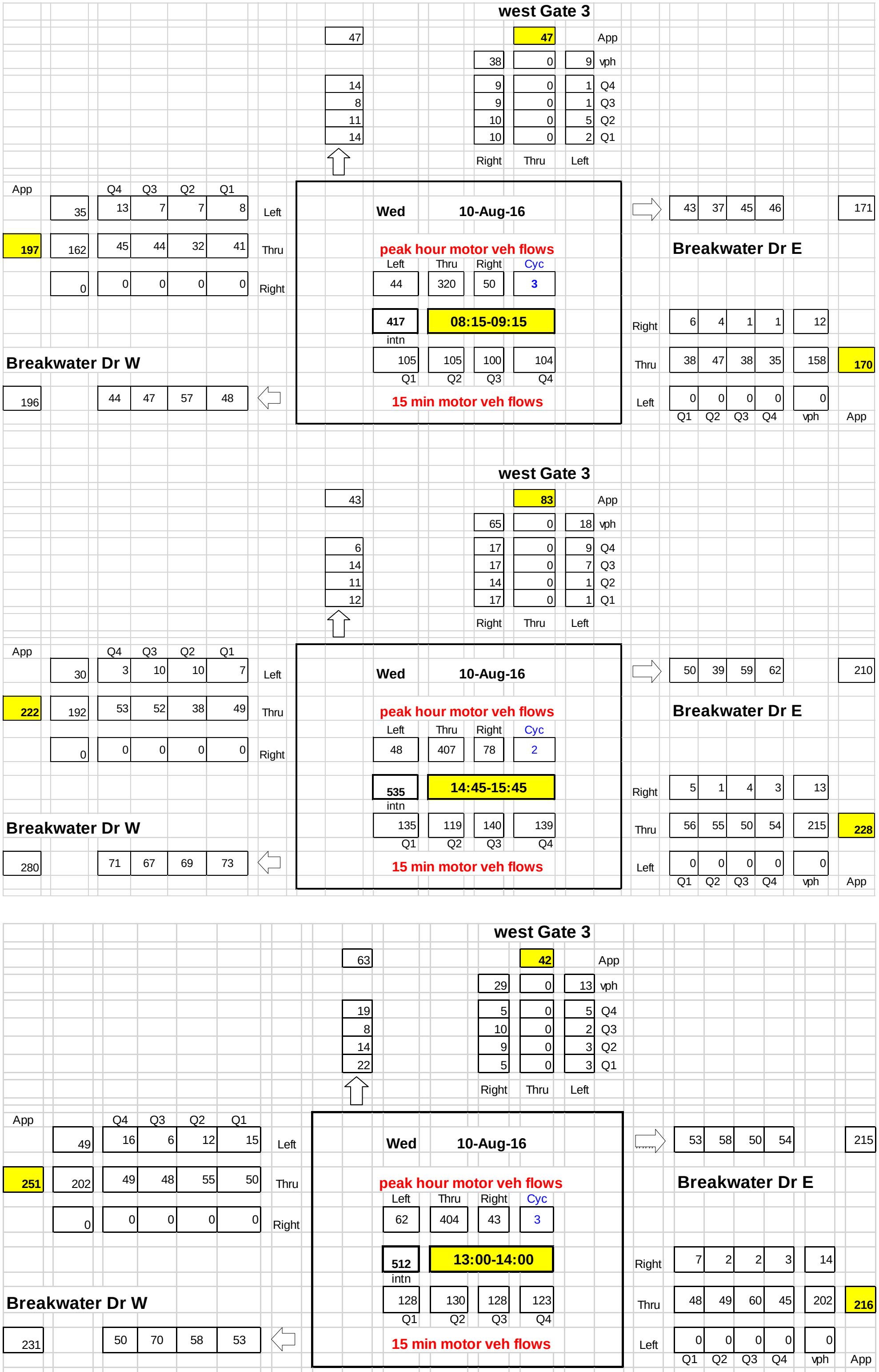

Figure D-2: Western Access surveyed quarter hour flows

These comprise the four quarter hour vehicle flows during the hour.

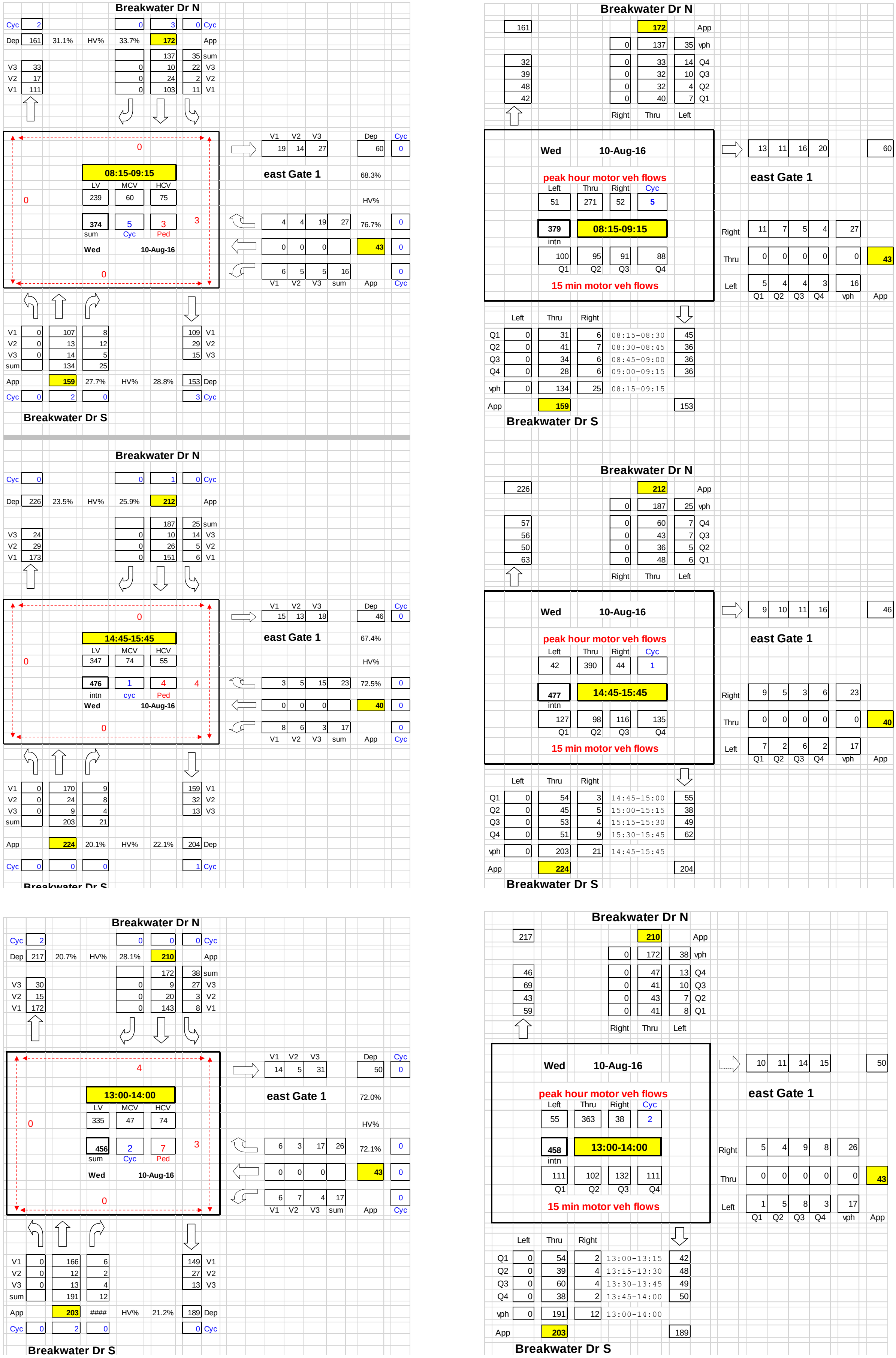

Figure D-3: Eastern Access surveyed flows

Appendix C Crash statistics

The main focus is safety pertaining to the additional truck traffic associated with the Port. The following tables give the truck crashes for all of Napier City and for the main access routes nearest the Port.

Table C-1: SH50 Hyderabad Rd / Bridge St / Ahuriri Bypass / Chatham St crashes involving trucks

Year	Fatal	Serious	Minor	Non-Injury	Total
2011					0
2012				2	2
2013					0
2014					0
2015				1	1
2016					0

Table C-2: SH50 Breakwater Road crashes involving trucks

Year	Fatal	Serious	Minor	Non-Injury	Total
2011					0
2012					0
2013					0
2014				1	1
2015					0
2016					0

Table C-3: Marine Parade (Coote Road – SH2 Ellison Street) crashes involving trucks

Year	Fatal	Serious	Minor	Non-Injury	Total
2011					0
2012				2	2
2013					0
2014					0
2015				1	1
2016				1	1

Note that Marine Parade is between Coote Road in the north and SH2 Ellison Street in the south. There have been no vehicle crashes reported in the six calendar years 2011 to 2016 along Breakwater Road between Coote Road and the eastern Port entrance (start of SH50). There was however one non-injury crash on 4 July 2014 that occurred at the eastern Port entrance involving a car colliding misjudging/not noticing the intentions of a truck swinging wide to turn left into the Port[6].

The crash history reveals that there have been no injury crashes associated with trucks along Breakwater Road and SH 50 east of SH 2 Pandora Road. The table below gives all crashes for the same 3.66 km route.

[6] This crash (ID 201440103) should have been recorded as being at SH 50 RP 0/0 and not solely as Breakwater Road (local road).

Table C-4: SH50 RS 0 crashes east of Pandora Road

Year	Fatal	Serious	Minor	Non-Injury	Total
2011			3	3	6
2012			1	1	2
2013			0	1	1
2014			0	3	3
2015			2	3	5
2016		1	1	3	5

Table C-5: SH50 RS 0 coded crashes east of Pandora Road plus Breakwater Road south

CRASH ROAD	CRASH DIST	CRASH DIRN	INTSN	SIDE ROAD	CRASH ID	CRASH DATE	CRASH DOW	CRASH TIME	MVMT	VEHICLES	CAUSES (FACTORS)	OBJECTS STRUCK	ROAD CURVE	ROAD WET	LIGHT	WTHR a	JUNC TYPE	TRAF CTRL	ROAD MARK	SPD LIM	CRASH FATAL	CRASH SEV	CRASH MIN	PERS AGE1	PERS AGE2	EASTING	NORTHING
BREAKWATER ROAD			A	PORT ENTRANCE	201440103	4/07/2014	Fri	1050	GF	TS1C	179A 387B		E	D	B	F	T	G	C	50	0	0	0			1937206	5622290
50/0/1.071			I	HORNSEY ROAD	201111160	8/02/2011	Tue	804	GD	CE1C	331A 363A 902		R	D	B	F	T	G	L	50	0	0	1			1936649	5622910
50/0/1.086	15	W		HORNSEY ROAD	201514678	23/06/2015	Tue	650	CC	CE1	129A 410A	I	R	D	B	F		N	R	50	0	0	1			1936634	5622909
50/0/1.357	100	E		BATTERY ROAD	201211649	5/04/2012	Thu	655	CB	CW1CC	103A 112A	FMM	R	W	DO	L		N	L	50	0	0	1			1936364	5622884
50/0/1.371	300	W		HORNSEY ROAD	201511484	1/03/2015	Sun	108	BF	CW1C	103A 111A 131A 402A		E	D	DO	F			C	50	0	0	2			1936351	5622883
50/0/1.487	30	W		BATTERY ROAD	201639061	14/05/2016	Sat	548	EC	CW1	326A 502A	S	R	D	DO	F		T	P	50	0	0	0			1936235	5622870
50/0/1.556	280	W		PORT GATE	201111078	13/01/2011	Thu	28	DA	40	103A 111A 632A	T	E	D	DO	F		N	C	50	0	0	1			1936167	5622870
50/0/1.654			I	WAGHORNE ST	201150753	18/02/2011	Fri	152	DA	CE1	103A 131A	IS	R	D	DO	L	T	S	R	50	0	0	0			1936120	5622784
50/0/1.714	60	S		WAGHORNE ST	201611397	25/02/2016	Thu	1435	DA	MS1	131A 352A		M	D	B	F			P	50	0	1	0			1936083	5622736
50/0/1.854	200	S		WAGHORNE ST	201541147	16/03/2015	Mon	1420	DA	CS1	111A 131A 632A 901	F	M	W	OF	H			C	50	0	0	0			1935946	5622714
BRIDGE ST			I	AHURIRI BYPASS	201254830	31/12/2012	Mon	2258	KA	CS1X	301A 830A		E	D	DO	F	M	G	C	50	0	0	0			1935255	5622506
50/0/2.588			I	BRIDGE ST	201154768	5/11/2011	Sat	115	DB	CS2	111A 131A 632A	H	M	D	DO	F	R	G	C	50	0	0	0			1935252	5622508
50/0/3.091			I	RIDDELL ST	201610593	28/01/2016	Thu	1101	FA	CN1V	366A		R	W	B	H	T	N	C	50	0	0	2			1934945	5622149
50/0/2.929			I	LEVER ST	201435816	7/04/2014	Mon	1930	FB	VW2C	181A		R		F		X	G	C	100	0	0	0			1935011	5622296
50/0/2.924			I	LEVER ST	201353729	21/09/2013	Sat	615	HA	MS1C	301B 375B		R	D	O	F	X	G	C	50	0	0	0			1935011	5622296
50/0/2.771			I	OSSIAN ST	201641864	24/06/2016	Fri	1252	FD	CE1C	331A		R	D	B	F	T	G	C	50	0	0	0			1935120	5622403
50/0/2.929			I	LEVER ST	201537685	15/06/2015	Mon	1416	KB	CN1C	301B 375B		R	D	B	F	X	G	C	50	0	0	0			1935011	5622296
50/0/2.929			I	LEVER ST	201648163	15/09/2016	Thu	1615	HA	CE2C	301A 112B		R	D	B	F	X	G	C	50	0	0	0			1935011	5622296
50/0/2.939	10	S		LEVER ST	201433436	21/03/2014	Fri	821	FD	CN1CC	331A 358A		R	D	OF	F	X	G	C	50	0	0	0			1935006	5622287
50/0/2.751	15	N		OSSIAN ST	201150647	23/02/2011	Wed	1730	MO	VS1C	371A	M	R	D	B	F		N	C	50	0	0	0			1935131	5622413
50/0/3.195			I	RICHARDSON PLACE	201112291	17/06/2011	Fri	750	LB	CS14	303B 375B		R	D	B	F	T	G	C	50	0	0	1			1934915	5622043
50/0/3.391	30	N		BATTERY ROAD	201548719	15/10/2015	Thu	1100	AA	4S1CCV	181B 331B 361B	M	R	D	B	F		N	C	50	0	0	0			1934858	5621856

Appendix D Photos of recent safety concerns

Photo 1: Pedestrian Maze in Shared Path

Photo 2: High Non-Standard Advisory Sign

Photo 3: Non-Standard Guide Lines and faded Give Way markings

Photo 4: Incorrect Shared Path signage

Photo 5: Public parking on Port land

Figure D-1: Western Access pedestrian/cyclist facility photos (source: Rob Partridge, Stantec NZ)

Appendix E SH50 Traffic flow patterns

Figure E-1: Local variation throughout the year in daily two-way flows

The four surveys during 2016 are compared with the nearest continuous sites comprising the WiM site on SH2 at Eskdale and the telemetry sites on SH50 at Taradale and on SH2 at Tangoio.

In addition the continuous site 00200651 on SH2 Hyderabad Road: Taradale Road to Georges Drive is provided (TMS has a limit of graphing up to four sites).

These reveal that the July 2016 and June 2013 surveyed daily flows are unusually (dubiously) low, while the Feb/Mar 2016 surveyed daily flows are unusually high.

The vehicle length data for the four years were exported from TMS for which strangely only the (typical) end-May 2016 survey appeared, the results of which are shown below.

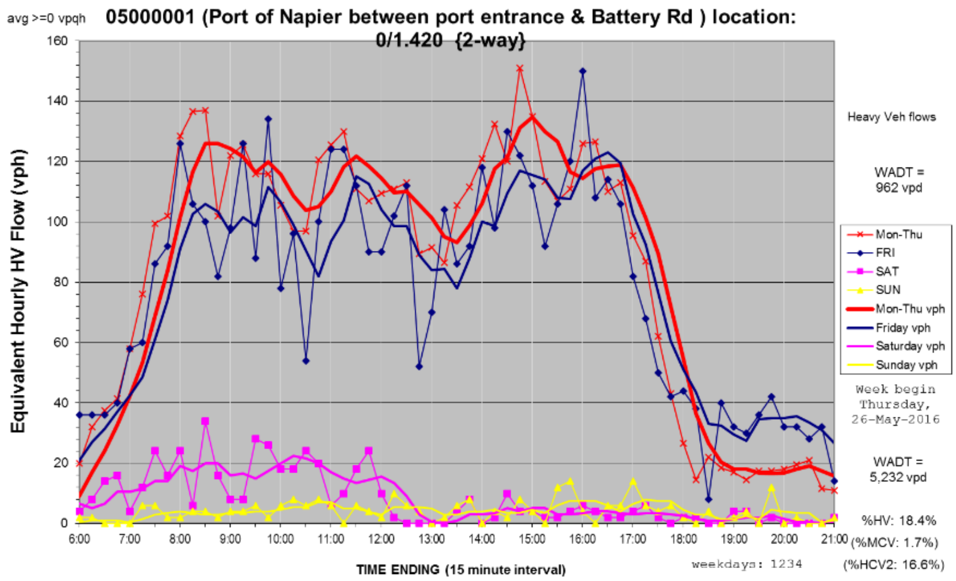

Figure E-2: Breakwater Road west heavy vehicle typical hourly two-way flow profile

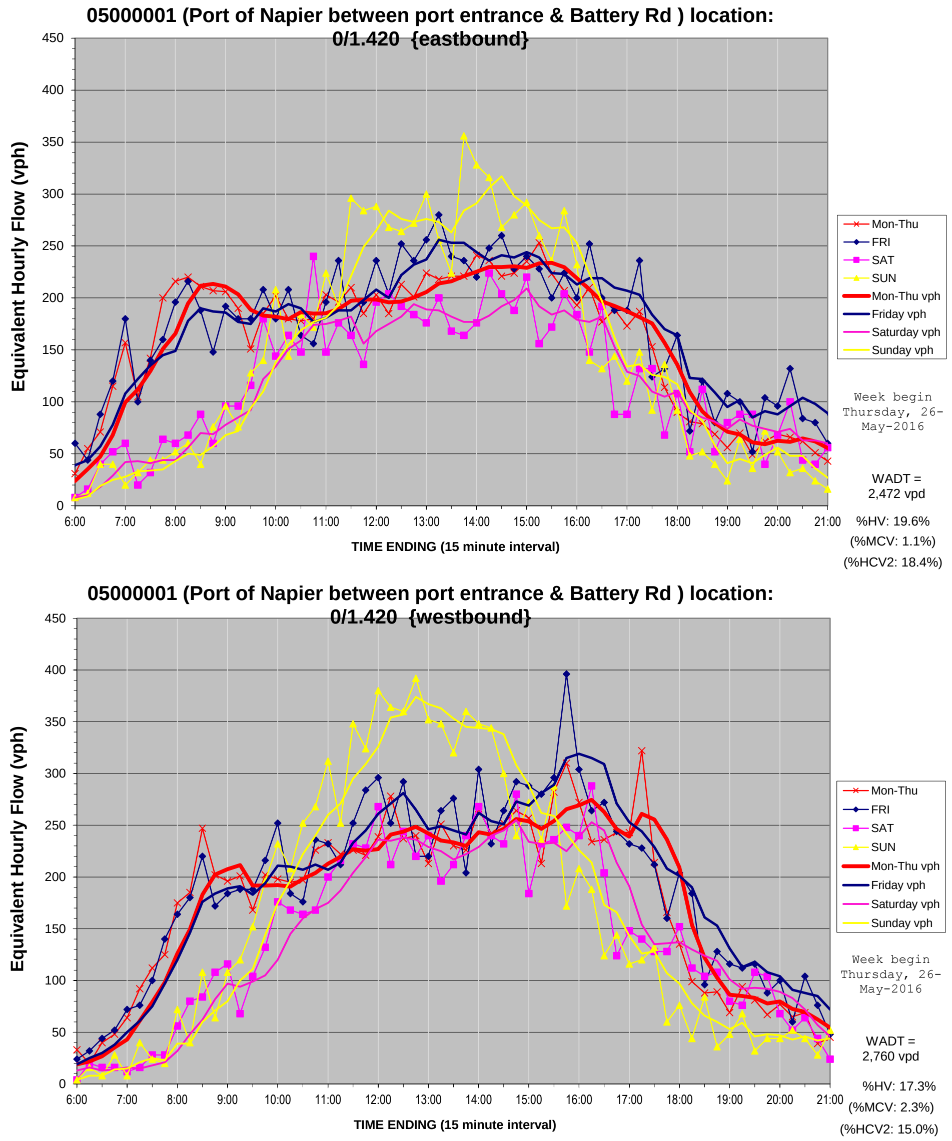

Figure E-3: Breakwater Road west vehicle typical hourly flow profile by direction

Appendix F Intersection performance outputs

Table F-1: Surveyed flows intersection performance: Western Access

LANE SUMMARY

▽ Site: 1 [Napier Port - West Entrance - Copy]

Napier Port - West Entrance
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Breakwater Road													
Lane 1	226	9.3	1839	0.123	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	14	23.1	969	0.014	100	3.4	LOS A	0.1	0.5	Short	80	0.0	NA
Approach	240	10.1		0.123		0.2	NA	0.1	0.5				
North: Napier Port Entrance													
Lane 1	19	11.1	1014	0.019	100	2.9	LOS A	0.1	0.5	Short	10	0.0	NA
Lane 2	68	43.1	410	0.167	100	8.9	LOS A	0.6	6.1	Full	100	0.0	0.0
Approach	87	36.1		0.167		7.6	LOS A	0.6	6.1				
West: Breakwater Road													
Lane 1	32	80.0	1183	0.027	100	5.3	LOS A	0.0	0.0	Short	80	0.0	NA
Lane 2	203	13.5	1793	0.113	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	235	22.4		0.113		0.7	NA	0.0	0.0				
Intersection	562	19.3		0.167		1.6	NA	0.6	6.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
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 lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Organisation: WANTY TRANSPORTATION CONSULTANCY LTD | Processed: Friday, 21 April 2017 12:52:44 PM
Project: C:\Users\David\Documents\Work2016\TIAmwh_NapierPort\SIDRA\NapierPort_DKW2.sip7

Table F-2: Surveyed flows intersection performance: Eastern Access

LANE SUMMARY

▽ Site: 2 [Napier Port - East Entrance]

Napier Port - East Entrance
Giveway / Yield (Two-Way)

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Breakwater Rd													
Lane 1	214	4.4	1895	0.113	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	23	18.2	1019	0.023	100	5.9	LOS A	0.1	0.7	Short	40	0.0	NA
Approach	237	5.8		0.113		0.6	NA	0.1	0.7				
East: Port Entrance													
Lane 1	18	17.6	987	0.018	100	5.7	LOS A	0.1	0.5	Short	10	0.0	NA
Lane 2	24	65.2	365	0.066	100	12.4	LOS B	0.2	2.6	Full	500	0.0	0.0
Approach	42	45.0		0.066		9.6	LOS A	0.2	2.6				
North: Breakwater Rd													
Lane 1	26	56.0	1327	0.020	100	5.1	LOS A	0.0	0.0	Short	80	0.0	NA
Lane 2	199	9.0	1842	0.108	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	225	14.5		0.108		0.6	NA	0.0	0.0				
Intersection	504	12.9		0.113		1.3	NA	0.2	2.6				

It should be noted that the flows above are approximately 5¼ % larger by default than the user input flows to take into account some variance in the quarter hour flows within the peak hour.

For the succeeding analysis scenario the default speed for the Port leg traffic was changed from 50 to 30 km/h and the default peak period for the Eastern Gate was changed from 30 to 15 minutes and peak flow factor from 95 to 90 per cent.

For the longer term design life analysis scenario the peak flow factor was changed to 96.5/96.6 %.

Table F-3: Peak construction flows intersection performance: Western Access

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Breakwater Road											
5	T1	226	9.3	0.123	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
6	R2	33	35.5	0.037	6.5	LOS A	0.1	1.3	0.39	0.58	40.8
Approach		259	12.6	0.123	0.8	NA	0.1	1.3	0.05	0.07	49.1
North: Napier Port Entrance											
7	L2	38	27.8	0.041	3.2	LOS A	0.1	1.3	0.32	0.41	40.6
9	R2	87	43.4	0.227	10.1	LOS B	0.9	8.6	0.63	0.76	35.9
Approach		125	38.7	0.227	8.0	LOS A	0.9	8.6	0.54	0.66	37.2
West: Breakwater Road											
10	L2	51	66.7	0.040	5.2	LOS A	0.0	0.0	0.00	0.52	41.8
11	T1	203	13.5	0.113	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		254	24.1	0.113	1.0	NA	0.0	0.0	0.00	0.10	48.7
All Vehicles		638	22.3	0.227	2.3	NA	0.9	8.6	0.13	0.20	46.9

With respect to the SIDRA modelled critical gap of the long term design life, examination of the detailed output revealed that for the right turn out, right turn in, and left turn out, the effective critical gaps applied were approximately 7.0, 5.0 and 4.75 seconds respectively. These values are considered reasonably conservative, with the SIDRA defaults meaning that the traffic turning right out did so in one movement, giving way to both directions of through traffic and the traffic turning right into the Port. The SIDRA default also assumed that traffic turning out of the Port give way to half the traffic turning left into the Port although with the wide and long left turn lane it is expected few vehicles turning out of the Port would give way to traffic turning left into the Port so there is added conservatism in the analysis of operational performance.

Table F-4: Long term design life flows intersection performance: Western Access signalised

LANE SUMMARY

Site: 1v [Napier Port - West Entrance - Future - Signals]

Napier Port - West Entrance
Signals - Fixed Time Isolated Cycle Time = 45 seconds (Practical Cycle Time)
Design Life Analysis (Practical Capacity): Results for 45 years

Lane Use and Performance													
	Demand Flows Total veh/h	Demand Flows HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	95% Back of Queue Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Breakwater Road													
Lane 1	323	9.3	858	0.376	100	8.6	LOS A	4.7	35.5	Full	500	0.0	0.0
Lane 2	32	23.1	213	0.149	100	22.3	LOS C	0.7	5.6	Short	80	0.0	NA
Approach	354	10.5		0.376		9.8	LOS A	4.7	35.5				
North: Napier Port Entrance													
Lane 1	44	11.1	918	0.048	100	6.9	LOS A	0.5	3.5	Short	10	0.0	NA
Lane 2	158	43.1	199[1]	0.793	100	27.2	LOS C	4.0	38.6	Full	100	0.0	0.0
Approach	202	36.1		0.793		22.8	LOS C	4.0	38.6				
West: Breakwater Road													
Lane 1	73	80.0	788	0.093	100	7.3	LOS A	0.5	5.3	Short	80	0.0	NA
Lane 2	290	13.5	359	0.808	100	23.6	LOS C	7.3	56.9	Full	500	0.0	0.0
Approach	363	26.9		0.808		20.3	LOS C	7.3	56.9				
Intersection	919	22.6		0.808		16.8	LOS B	7.3	56.9				

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

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Note that the above is a preliminary indicative only assessment.