

3

Draft : Environmental Impact Statement

Chapter B14 Transport

B14.1	Introduction	2	B14.11	Mitigation Strategy	25
B14.2	Methodology	2	B14.11.1	Bus and Taxi Provision	25
B14.3	Assumptions and Technical Limitations	2	B14.11.2	Pedestrian Links	25
B14.4	Policy Context and Legislative Framework	3	B14.12	Construction Traffic	26
B14.5	Baseline and Design Year	3	B14.12.1	Wharf Upgrade Construction	26
B14.6	Study Area	3	B14.12.2	Land-side Infrastructure Construction	26
B14.7	Existing Environment	6	B14.12.3	Construction Traffic Generation	26
B14.7.1	Local Transport and Pedestrian Network Overview	6	B14.13	Residual Assessment Summary	27
B14.7.2	Existing Background Traffic	6	B14.14	References	28
B14.7.3	Baseline Traffic Assessment	7	B14.15	Glossary	28
B14.7.4	Wharf Street/Lake Street/Port Access Intersection	9			
B14.8	Yorkeys Knob	15			
B14.8.1	Traffic Conditions	15			
B14.9	Description of Significance Criteria	16			
B14.10	Potential Transport Impacts	17			
B14.10.1	Predicted Future Port Terminal Traffic and Design Volumes	17			
B14.10.2	Intersection Analysis	20			
B14.10.3	Bus and Taxi Provision	23			
B14.10.4	Pedestrian links	24			
B14.10.5	Service Vehicles	24			
B14.10.6	Car Parking Arrangements	24			
B14.10.7	Yorkeys Knob	24			
B14.10.8	Summary	25			

B14.1 Introduction

The purpose of this chapter is to document the existing traffic and transport conditions in the study area, before construction and operation of the proposed Cairns Shipping Development Project (the project) and assess the potential impacts of the project on the existing road network and transport infrastructure. This chapter specifically looks at traffic and transport issues associated with the surrounding road network (e.g. construction vehicles, transportation of cruise ship passengers, deliveries to the Cairns Cruise Liner Terminal (CCLT)). Shipping traffic and operations are addressed in **Chapter C4, Maritime Operations Management Plan**.

B14.2 Methodology

The methodology for transport impact assessment is as follows:

- Assessment of existing traffic and transport conditions including:
 - Description of the surrounding road network (including intersections that may be impacted by the project)
 - Assessment of existing transport (bus and taxi) provisions and car parking arrangements
 - Assessment of existing pedestrian facilities
 - Assessment of existing service vehicle arrangements.
- Establishment of significance criteria to assess potential impacts of the project against the existing environment and relevant standards
- Assessment of the potential operational impacts of the project by
 - Determining the volume and distribution of traffic generated by the operation in the design year
 - Assessment of potential impacts of the project on the existing road network and other transport infrastructure during both construction and operation with reference to the significance criteria (refer to **Section B14.9**)
 - Assessment of the impact risk rating of potential impacts, with reference to the significance criteria
 - Identify appropriate mitigations if necessary to reduce or avoid impacts and assess residual risks.
- Assessment of the potential construction impacts of the project.

B14.3 Assumptions and Technical Limitations

In the development of this transport impact assessment, the following assumptions have been made:

- Existing developments in the area will continue to operate
- Background traffic growth will continue at a compound growth rate of three percent per annum, consistent with the current Cairns Regional Council (CRC) traffic model
- There are no significant planned upgrades to the local transport network. This has been confirmed with discussions with CRC's traffic engineers in late 2013
- Baseline traffic volumes on the surrounding road network were determined using data from traffic counts undertaken on 22 February 2013. This date was selected to coincide with the docking of two cruise ships, *Rhapsody of the Seas* and *Seabourn Quest*, at the Cairns Cruise Liner Terminal (CCLT). *Rhapsody of the Seas* is a mega-size ship and has a capacity of 2100 passengers and 858 crew, whilst the *Seabourn Quest* is a boutique-size ship with a passenger capacity of 450 passengers and 330 crew. The *Rhapsody of the Seas* is the only mega cruise ship that can, on a favourable tide, enter the Port of Cairns
- Traffic impact predictions have been conservatively based on full passenger capacity of the vessel disembarking at once. Crew have not been included as normal operating procedure would have a delay between passenger and crew disembarking.
- No impact on the operation of the North Coast Line (regional freight and passenger rail line) is proposed during construction and operation of the CSDP, in particular for the IFO pipeline. The detailed design, construction and operation of the IFO pipeline crossing of the rail line will be undertaken in consultation with and approval from the appropriate authority (QR/TMR). It is therefore not considered further as part of this transportation impact assessment.

B14.4 Policy Context and Legislative Framework

The development of this chapter includes reference to the current policy and legislative framework that relates to transport issues.

The 2006 *Guidelines for Assessment of Road Impacts of Development* (Department of Transport and Main Roads (DTMR)) provides guidelines for assessing road impacts of proposed developments, and identifies mitigation measures to minimise potential road impacts. For this project, the specific criteria for 'acceptable limits of operation for intersections' has been used.

The 2009 Austroads *Guide to Traffic Management (Part 12 Traffic Impacts of Development)* provides standards for the assessment of traffic impacts.

B14.5 Baseline and Design Year

The traffic impact of developments is conducted at the baseline and project 'design' year in order that assessments are carried out for peak conditions where impacts may be at their greatest. The operational phase design year is taken as the first year of operation of the upgraded CCLT facility, assuming the level of operational traffic movement is constant.

The baseline traffic year assessed is 2016 and the 'design year' is 2026, which is consistent with the Cairns Cruise Shipping Development - Demand Study Update 2014 (The Demand Study).

B14.6 Study Area

The initial transportation assessment study area was defined based on a high-level desktop assessment of the project, existing and future traffic volumes, traffic distribution and the surrounding road network. It identified one major intersection likely to be impacted by construction and operation, being the Wharf Street/Lake Street/Port Access Road signalised intersection.

A minor, signalised intersection between the Port Access Road and Wharf Street to the south of the CCLT is used as the exit point for buses and taxis and the entry/exit point for service vehicles on cruise ship days outside of the passenger unloading peak period. Due to the low expected traffic volumes and turn movements this intersection will experience a negligible impact.

The transport assessment study area includes the key Wharf Street/Lake Street/Port Access Road signalised intersection, Yorkeys Knob and various transport elements in the vicinity of CCLT building, which have the potential to be impacted by the proposed development. The study area is depicted in **Figure B14.6a** and **Figure B14.6b**.

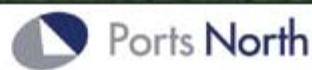
Figure B14.6a Cairns Cruise Liner Terminal Study Area



Figure B14.6b Yorkeys Knob Study Area



 Yorkeys Knob study area



Job Title
**Cairns Shipping Development Project
EIS**

Map Title
Yorkey's Knob Study Area



1	30/10/2014	MTM	RM	EP
Issue	Date	By	Chkd	Appd

ARUP



Scale at A4

Map Status

1:1,917

Final

Coordinate System

GDA 1994 MGA Zone 55

Job No

Figure No

230377-00

B14.6b

B14.7.4.1 Intersection Analysis

The capacity of the Wharf Street/Lake Street/Port Access Road intersection was assessed for the 2013 existing and 2016 and 2026 baseline design years for both AM and PM periods, as are presented in **Tables B14.7.4.1a-f**. The results of this analysis are summarised in tabular format, which make reference to three intersection performance criteria:

- Degree of Saturation (%) – This is the ratio of demand flow to capacity
- Average Delay (sec) – The average delay per vehicle in seconds incurred by vehicles over the modelled time period
- 95th percentile Queue – A queue length measured in metres for which only five percent of queues are equal to or greater than.

In assessing the results of the analysis, the criteria for acceptable limits of operation for intersections as specified by the Department of Transport and Main Roads (DTMR) *Guidelines for Assessment of Road Impacts of Development 2006*, has been adopted for this assessment. For a signalised intersection the acceptable limit of operation is reached when the Degree of Saturation (DOS) exceeds 90 percent.

Table B14.7.4.1a 2013 AM Intersection Analysis Results

Approach	Direction	Movement	Degree of Saturation (%)	Average Delay (seconds)	95th Percentile Queue (metres)
Wharf St (Sth)	Northbound	Left	9	8	3
		Through	35	14	49
		Right	8	22	5
Port Access	Westbound	Left	3	23	2
		Through	3	14	2
		Right	3	23	2
Wharf St (Nth)	Southbound	Left	20	21	25
		Through	20	13	25
		Right	8	25	5
Lake Street	Eastbound	Left	12	23	13
		Through	12	15	13
		Right	14	23	13

Table 14.7.4.1b 2013 PM Intersection Analysis Results

Approach	Direction	Movement	Degree of Saturation (%)	Average Delay (seconds)	95th Percentile Queue (metres)
Wharf St (Sth)	Northbound	Left	3	8	1
		Through	30	15	38
		Right	3	25	2
Port Access	Westbound	Left	7	22	7
		Through	7	13	7
		Right	7	22	7
Wharf St (Nth)	Southbound	Left	29	23	38
		Through	29	15	38
		Right	12	25	7
Lake Street	Eastbound	Left	12	22	14
		Through	12	14	14
		Right	14	22	13

The above results suggest that the intersection is currently operating within the accepted limits of operation, for both the AM and PM peak periods, whilst existing cruise ships classes are docked at the terminal.

The results of the Wharf Street/Lake Street/Port Access intersection analysis for the predicted 2016 AM and PM baseline scenarios have been summarised in **Tables B14.7.4.1c** and **Table B14.7.4.1d** respectively.

Table B14.7.4.1c 2016 AM Baseline Intersection Analysis Results

Approach	Direction	Movement	Degree of Saturation (%)	Average Delay (seconds)	95th Percentile Queue (metres)
Wharf St (Sth)	Northbound	Left	10	8	3
		Through	37	13	52
		Right	8	22	5
Port Access	Westbound	Left	3	23	3
		Through	3	15	3
		Right	3	23	3
Wharf St (Nth)	Southbound	Left	20	21	27
		Through	20	12	27
		Right	9	25	5
Lake Street	Eastbound	Left	14	24	15
		Through	14	16	15
		Right	15	24	14

Table B14.7.4.1d 2016 PM Baseline Intersection Analysis Results

Approach	Direction	Movement	Degree of Saturation (%)	Average Delay (seconds)	95th Percentile Queue (metres)
Wharf St (Sth)	Northbound	Left	4	8	1
		Through	31	15	42
		Right	4	26	2
Port Access	Westbound	Left	8	22	7
		Through	8	13	7
		Right	8	22	7
Wharf St (Nth)	Southbound	Left	31	23	42
		Through	31	15	42
		Right	13	26	8
Lake Street	Eastbound	Left	13	22	15
		Through	13	14	15
		Right	16	22	15

The above results suggest that the intersection is expected to operate within the accepted limits of operation whilst existing cruise ship classes are docked at the terminal for both the 2026 AM and PM peak periods.

The results of the Wharf Street/Lake Street/Port Access intersection analysis for the predicted 2026 AM and PM peak period have been summarised in **Tables 14.7.4.1e** and **Table 14.7.4.1f** respectively.

Table 14.7.4.1e 2026 AM Baseline Intersection Analysis Results

Approach	Direction	Movement	Degree of Saturation (%)	Average Delay (seconds)	95th Percentile Queue (metres)
Wharf St (Sth)	Northbound	Left	14	9	5
		Through	88	37	142
		Right	37	42	16
Port Access	Westbound	Left	70	38	56
		Through	70	30	56
		Right	70	38	56
Wharf St (Nth)	Southbound	Left	71	34	90
		Through	71	26	90
		Right	55	47	17
Lake Street	Eastbound	Left	39	34	35
		Through	37	25	35
		Right	52	40	28

Table 14.7.4.1f 2026 PM Baseline Intersection Analysis Results

Approach	Direction	Movement	Degree of Saturation (%)	Average Delay (seconds)	95th Percentile Queue (metres)
Wharf St (Sth)	Northbound	Left	5	8	2
		Through	80	29	110
		Right	64	47	22
Port Access	Westbound	Left	51	35	28
		Through	51	27	28
		Right	51	35	28
Wharf St (Nth)	Southbound	Left	84	40	123
		Through	84	32	123
		Right	48	44	18
Lake Street	Eastbound	Left	57	35	54
		Through	57	27	54
		Right	45	37	29

The above results suggest that the intersection is expected to operate within the accepted limits while existing cruise ship classes are docked at the terminal, for both the 2026 AM and PM peak periods.

B14.7.4.2 Bus and Taxi Provision

The existing bus and taxi volumes were determined by a traffic count conducted at the Wharf Street/Lake Street/Port Access intersection on 17 November 2011 between 11-1- pm, while the *Rhapsody of the Seas* cruise ship was docked at the terminal. The tour schedule running sheet was also collected from the tour bus operators on 17 November 2011 and 25 November 2011 for the mega ships *Rhapsody of the Seas* and the *Pacific Sun* (passenger capacity 2156) respectively. The *Rhapsody of the Seas* is the largest ship that can dock at the CCLT and represents the current worst-case scenario.

Through discussion with Ports North staff and tour operators it was determined that maximum bus and taxi numbers occur during a 24-hour cruise ship turnaround (indicating that all tours are taken in one day). As the data collected for the above ship visits was for a 48 hour cruise ship turnaround, it is possible (but unlikely) that the number of tour operations on each day could be half that for a single day visit. Consequently, the collected data has been doubled to provide a 24-hour calculation. This is considered to be a conservative assumption.

The collected traffic data (48-hour turnaround) and calculated data (24-hour turnaround) is shown in **Table 14.7.4.2a**.

Table 14.7.4.2a Existing Bus and Taxi Volumes

Cruise Ship	Total Passenger + Crew Numbers	No. Of Buses (48 hour Turnaround)	No. Of Taxis (48 hour Turnaround)	Calculated Bus Numbers (24 hour Turnaround)	Calculated Taxi Numbers (24 hour Turnaround)
Rhapsody of the Seas	2765	11	20	22	40
Pacific Sun	2156	13	4	26	8

The current bus and taxi set-down facility can cater for a maximum of six buses and five taxis at any one time. Based on the worst-case scenario of a 24-hour turnaround, a maximum number of 26 buses and 40 taxis could be expected. In the event of this worst-case scenario occurring, some queuing of bus and taxi services would be anticipated during this peak period, resulting in some minor delays and congestion within the port roads. This occurrence would be infrequent and does not warrant the upgrade of the bus and taxi facility based on existing cruise visits.

Given the likelihood that a large number of different destination points exist for the bus and taxi services, there is likely to be a wide variety of possible bus and taxi travel routes from the port. Consequently, the impact of the bus and taxi services has a negligible impact to the wider road network based on the volumes described in **Table B14.7.4.2a**.

B14.7.4.3 Pedestrian links

There are a number of existing pedestrian links and facilities from the CCLT to the Cairns CBD and Cairns Esplanade as follows:

- Shared pedestrian link at the southern end of the CCLT via the park to Wharf Street
- Pedestrian path providing access along the Port Access Road to the Wharf Street/Lake Street/Port Access Road signalised intersection
- Pedestrian path at the northern end of the CCLT providing access to the Wharf Street/Abbott Street/Car Park Access signalised intersection
- Pedestrian path at the northern end of the CCLT providing access to the Cityport North precinct, including the Marlin Marina and north around to the Esplanade boardwalk.

Recent improvements to these pedestrian links have increased their amenity, providing more space for pedestrians while cruise ships are docked. Access ramps and pram ramps are provided for people with a disability.

Based on on-site observations, the current arrangements have sufficient capacity to cater for the existing pedestrian numbers under normal conditions and when cruise ships are docked. Safe pedestrian crossing facilities exist at the Wharf Street/Lake Street Access intersection and at the Wharf Street/Abbott Street/Car Park Access intersection. Both these intersections have signalised pedestrian crossings and it is considered that the existing pedestrian facilities are sufficient to cater for the existing demand.

B14.7.4.4 Service Vehicles

Service vehicles up to and including articulated vehicles have access to the Port of Cairns. Vehicular access is via a ramp off the Port Access Road located to the south of the CCLT.

All access and egress manoeuvres by service vehicles to the Port of Cairns can be accommodated with and without a cruise ship docked at the CCLT.

When no cruise ships are docked at the terminal, the wharf and docks can be reached via the Port Access Road from both directions. When a cruise ship is docked at the CCLT the wharf can be accessed via the Port Access Road from the south only. The current design is adequate to service the existing requirements and no upgrade is required.

B14.7.4.5 Car Parking Arrangements

The existing CCLT car park contains 115 car parking spaces, including the provision of four disabled parking bays.

The existing car park has three access and egress points:

- Access only entry located at the Wharf Street/Abbott Street signalised intersection
- Access only entry located on the Port Access Road in close proximity to the Wharf Street/Lake Street/Port Access Road intersection
- Egress only exit located on the Port Access Road near the northern end of the port terminal.

The car park is currently ticket controlled, with three ticket machines.

Observations on-site during days when cruise ships are docked indicate the car park has significant spare capacity with less than 50 percent occupied. As the Port of Cairns is not a significant origin or destination port, cruise ship passengers do not have their own means of vehicular transport and most passengers use buses and taxis or walk to experience the city. Consequently the parking demand is minimal and the existing car park facility is adequate for existing demand.

B14.8 Yorkeys Knob

B14.8.1 Traffic Conditions

Due to the existing constraints of the Cairns shipping channel, larger cruise ships currently utilise the Yorkeys Knob Boating Club and Half Moon Bay Marina for anchorage in Cairns. Ships that cannot access the port of Cairns will typically anchor approximately four km offshore from Yorkeys Knob and ferry passengers ashore.

Due to the isolated location of Yorkeys Knob from major tourist attractions and the CBD, all land-side passenger movements occur via tour buses and taxis. The majority of passenger trips are via tour buses with a minimal number of taxis required. A total of 13 coaches and two taxis were required for the unloading of the *Pacific Dawn* on 24 September 2013. Based on conversations with tour operators on-site, this is considered a typical event.

Due to the limited number and observations on site of traffic movements, a detailed intersection analysis is not warranted.

No formal bus parking bays are provided on site, with all bus tour loading occurring within the yacht club car parking area. This can cause some congestion and disruption, particularly with passenger vehicles often blocked in during loading activities.

Ports North is currently working with Yorkeys Knob Boating Club to upgrade facilities including:

- Improved bus parking and passenger pickup/drop-off
- Covered areas and seating for waiting passengers
- Upgraded pontoon and walkways to allow improved and increased capacity for berthing of ship tenders
- Land-side hardstands and landscaping.

These works are expected to be completed in 2015 and will provide improved facilities and amenities for the regional recreational boating population as well as improve the transfer efficiency, safety and the passenger experience for the largest mega cruise ships that will continue to be required to anchor offshore at Yorkeys Knob in the future (e.g. *The Queen Mary*).

The upgrade will also provide an intermediate improvement to the transfer efficiency, safety and passenger experience for any mega cruise vessels using Yorkeys Knob until they can use the Port of Cairns upon completion of the project.

B14.9 Description of Significance Criteria

Significance Criteria for the impact assessment have been developed as outlined in the assessment methodology in **Section B14.2** above, and are shown in **Table B14.9a**.

Table B14.9a Significance Criteria

Significance	Criteria
Very High	<ul style="list-style-type: none"> Traffic significantly exceeds acceptable levels of operation (degree of saturation 90 percent), requiring substantial upgrade of the road network Permanent loss of access or road closures required Major upgrades to the existing bus and taxi provisions Major upgrades to existing pedestrian and cycling network required Major upgrades required to accommodate construction traffic
High	<ul style="list-style-type: none"> Traffic exceeds acceptable levels of operation (degree of saturation 90 percent), requiring substantial upgrade of the road network Long-term loss of access or road closures required Intermediate upgrades to the existing bus and taxi provisions Intermediate upgrades to existing pedestrian and cycling network required Intermediate upgrades required to accommodate construction traffic
Moderate	<ul style="list-style-type: none"> Traffic slightly exceeds acceptable levels of operation (degree of saturation 90 percent), requiring some level of upgrade to the road network Long/medium-term loss of access or road closures required Minimal upgrades to the bus and taxi provisions Minimal upgrades to pedestrian and cycling network required Minimal upgrades required to accommodate construction traffic
Minor	<ul style="list-style-type: none"> Impact on traffic recognisable but acceptable (degree of saturation 90 percent), with no upgrade to the road network required Temporary loss of access or road closures required Impact on bus and taxi provisions recognisable, but acceptable level of service met with minor changes to operational procedures Impact on pedestrian and cycling network recognisable, but acceptable level of service and safety met Impact to traffic conditions based on construction is recognisable but acceptable
Negligible	<ul style="list-style-type: none"> No change to existing traffic conditions No loss of access or road closure No change to bus and taxi provisions No change to the existing pedestrian and cycling network No impact to traffic conditions as a result of construction
Positive	<ul style="list-style-type: none"> Improved traffic conditions Additional access to facilities provided Improvements to bus and taxi provisions Improvements to the pedestrian and cycling network Improvements to traffic conditions due to construction

Table B14.9b Risk Matrix

Likelihood	Significance				
	Negligible	Minor	Moderate	High	Very High
Highly Unlikely/ Rare	Negligible	Negligible	Low	Medium	High
Unlikely	Negligible	Low	Low	Medium	High
Possible	Negligible	Low	Medium	Medium	High
Likely	Negligible	Medium	Medium	High	Extreme
Almost Certain	Low	Medium	High	Extreme	Extreme

Table B14.9c Risk Matrix Legend

Extreme Risk	An issue requiring change in project scope; almost certain to result in a 'significant' impact on a Matter of National or State Environmental Significance
High Risk	An issue requiring further detailed investigation and planning to manage and reduce risk; likely to result in a 'significant' impact on a Matter of National or State Environmental Significance
Medium Risk	An issue requiring project specific controls and procedures to manage
Low Risk	Manageable by standard mitigation and similar operating procedures
Negligible Risk	No additional management required

B14.10 Potential Transport Impacts

The assessment of the traffic generated by the proposed operation of the CCLT has been undertaken to determine the potential impact on the following aspects of the transportation network:

- Intersection capacity: Potential for increased delay caused by insufficient capacity of existing intersections to cater for increased traffic whilst cruise ships are docked
- Bus and taxi facilities: Potential for increased congestion and safety issues due to insufficient bus and taxi provisions
- Pedestrian facilities: potential for increased pedestrian numbers exceeding capacity of existing facilities resulting in an increased risk of vehicle and pedestrian conflicts
- Car parking: potential for increased parking demand exceeding existing facilities should there be insufficient car parking spaces due to increased parking demand
- Yorkeys Knob consequential transportation impacts.

B14.10.1 Predicted Future Port Terminal Traffic and Design Volumes

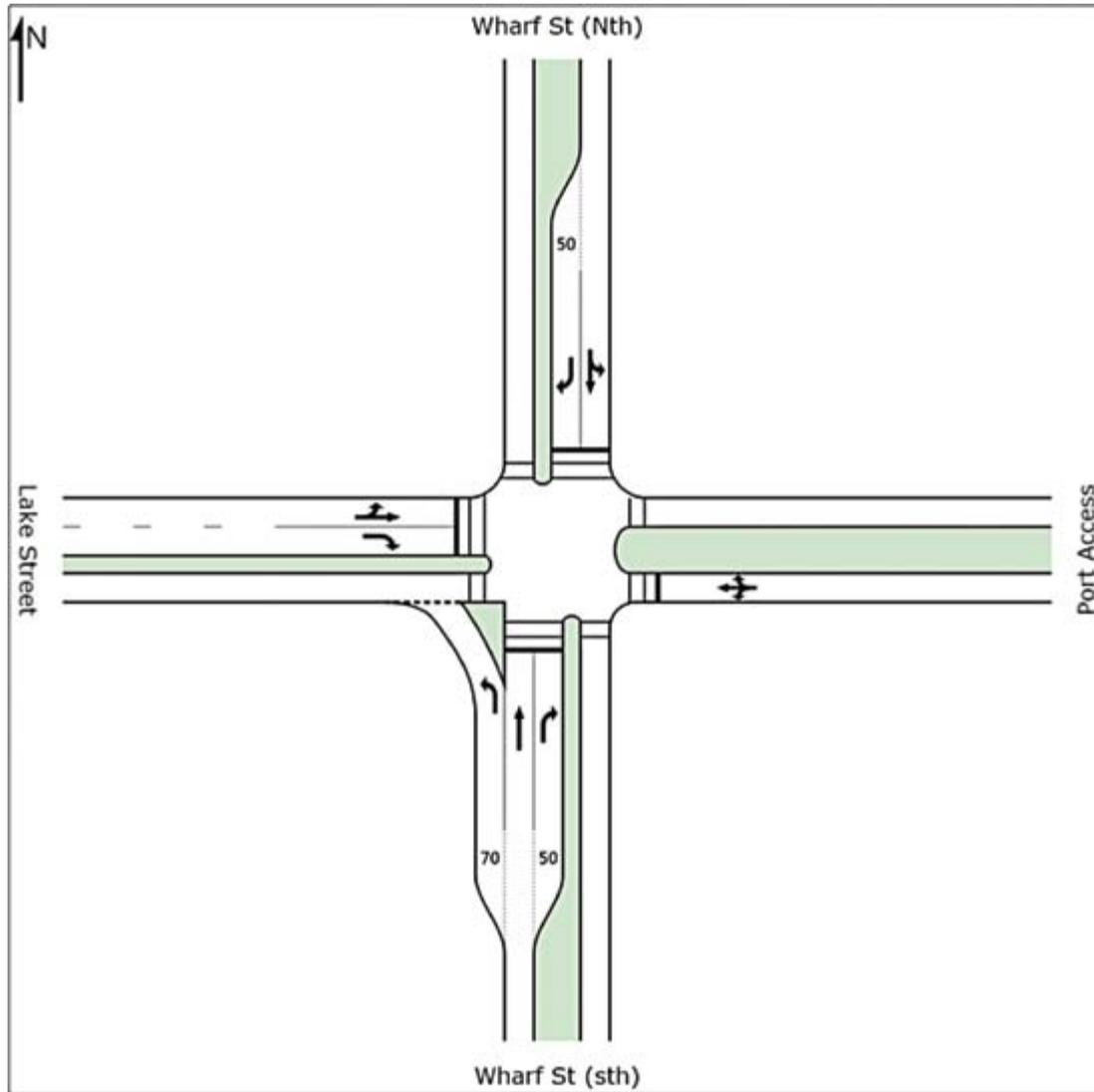
The assessment of the potential impacts of traffic generated by the project has been undertaken by assessing the potential impact of the maximum passengers from the largest known mega ship anticipated to visit Cairns (*Voyager of the Seas*) against predicted background 2016 and 2026 AM and PM design years.

Therefore to determine the predicted 2016 design turning volumes, the predicted 2016 background traffic AM and PM turning volumes (determined in **Section B14.7.3**) to/from the Port Access leg, have been doubled to account for all ships up to and including the *Voyager of the Seas*. The *Voyager of the Seas* has a passenger capacity of 5014 which is approximately double the passenger and crew of the current largest ship (*Rhapsody of the Seas*) which docks at the CCLT. This represents the worst-case scenario as the majority of ships docking at the CCLT will result in ship classes with significantly less passengers and crew than the *Voyager of the Seas*.

B14.10.2 Intersection Analysis

The Wharf Street/Lake Street/Port Access intersection is currently a signalised intersection. CRC officers have indicated that no upgrades to the Wharf Street/Lake Street/Port Access intersection are programmed and consequently the existing intersection layout will remain for the 2016 and 2026 design years. An indicative layout of the intersection is shown in **Figure B14.10.2a**.

Figure B14.10.2a Wharf Street/Lake Street/Port Access Intersection



The results of the Wharf Street/Lake Street/Port Access intersection analysis for the 2016 AM and PM design scenarios have been summarised in **Table 14.10.3a** and **Table B14.10.3b** respectively.

Table B14.10.3a 2016 AM Design Scenario Intersection Analysis Results

Approach	Direction	Movement	Degree of Saturation (%)	Average Delay (seconds)	95th Percentile Queue (metres)
Wharf St (Sth)	Northbound	Left	10	8	3
		Through	37	13	52
		Right	17	23	10
Port Access	Westbound	Left	6	24	5
		Through	6	15	5
		Right	6	24	5
Wharf St (Nth)	Southbound	Left	22	21	28
		Through	22	12	28
		Right	9	25	5
Lake Street	Eastbound	Left	15	24	16
		Through	15	16	16
		Right	16	24	14

Table B14.10.3b 2016 PM Design Scenario Intersection Analysis Results

Approach	Direction	Movement	Degree of Saturation (%)	Average Delay (seconds)	95th Percentile Queue (metres)
Wharf St (Sth)	Northbound	Left	4	8	1
		Through	32	15	42
		Right	7	26	4
Port Access	Westbound	Left	16	22	15
		Through	16	14	15
		Right	16	22	15
Wharf St (Nth)	Southbound	Left	32	23	42
		Through	32	15	42
		Right	13	26	8
Lake Street	Eastbound	Left	13	22	15
		Through	13	14	15
		Right	16	23	15

The above results suggest that the intersection is expected to operate within the generally accepted limits of operation, for both the 2016 AM and PM peak periods.

The results of the Wharf Street/Lake Street/Port Access intersection analysis for the 2026 AM and PM design scenarios have been summarised in **Table B14.10.3c** and **Table B14.10.3d** respectively.

Table B14.10.3c 2026 AM Design Scenario Intersection Analysis Results

Approach	Direction	Movement	Degree of Saturation (%)	Average Delay (seconds)	95th Percentile Queue (metres)
Wharf St (Sth)	Northbound	Left	14	9	5
		Through	88	37	142
		Right	58	44	24
Port Access	Westbound	Left	77	40	63
		Through	77	32	63
		Right	77	40	63
Wharf St (Nth)	Southbound	Left	73	35	93
		Through	73	26	93
		Right	55	47	17
Lake Street	Eastbound	Left	40	34	36
		Through	40	26	36
		Right	56	41	29

Table B14.10.3d 2026 PM Design Scenario Intersection Analysis Results

Approach	Direction	Movement	Degree of Saturation (%)	Average Delay (seconds)	95th Percentile Queue (metres)
Wharf St (Sth)	Northbound	Left	5	8	2
		Through	79	29	109
		Right	74	48	26
Port Access	Westbound	Left	76	41	50
		Through	76	33	50
		Right	76	41	50
Wharf St (Nth)	Southbound	Left	84	40	123
		Through	84	32	123
		Right	48	44	18
Lake Street	Eastbound	Left	57	35	54
		Through	57	27	54
		Right	56	40	31

The above results suggest that the intersection is expected to operate within the generally accepted limits of operation with degrees of saturation <90 percent), for both the 2026 AM and PM peak periods.

When assessed against the significance criteria outlined in the baseline chapter, the significance of the development on the Wharf Street/Lake Street/Port Access Intersection is considered minor and the potential residual risk estimated to be low (refer to **Table B14.12.3.3a**). The impact on the Wharf Street / Lake Street / Port Access intersection is expected to result in a minimal increase to the degree of saturation and average delay. No physical upgrades to the intersection would be therefore triggered or required as part of the project.

B14.10.3 Bus and Taxi Provision

The existing bus and taxi requirements were determined using classified traffic count data and were discussed as part of the baseline assessment in **Section B14.7**.

The collected traffic data has been used to determine the existing generation rates of buses and taxis per total numbers of passengers and crew, for the maximum passenger disembarking scenario (largest mega ship). **Table B14.10.4a** shows calculation of the existing bus and taxi generation rates.

Table B14.10.4a Existing Bus and Taxi/Passenger Ratio

Name	Total Passenger and Crew Numbers	Bus Numbers	Taxi Numbers	Buses/Total Numbers Ratio	Taxis/Total Numbers Ratio
Rhapsody of the Seas	2765	22	40	0.0079566	0.014467
Pacific Sun	2156	26	4	0.01205937	0.001855
			Average	0.01000798	0.008161

The existing average generation rates for buses and taxis have been extrapolated and applied to the proposed study options to determine the expected future bus and taxi numbers. The predicted bus and taxi numbers for the project are shown in **Table B14.10.4b** below.

Table B14.10.4b Predicted Bus and Taxi Numbers

Name	Total Passenger Numbers	Bus Numbers	Taxi Numbers
Pacific Dawn	2606	26	21
Pacific Jewel	2587	26	21
Queen Elizabeth	3173	32	26
Queen Victoria	3173	32	26
Dawn Princess	3150	32	26
Sun Princess	3150	32	26
Adventure of the Seas	4294	43	35
Voyager of the Seas	5014	50	41
Grand Princess	4200	42	34
Golden Princess	3690	37	30
Star Princess	3740	37	31

Based on the maximum bus and taxi scenario (24 hour turnaround) and docking of the largest mega class ship (*Voyager of the Seas*), approximately 50 buses and 40 taxis would be expected. Although this level of traffic will be experienced more regularly with the upgrade, the occurrence will still be infrequent and while some management measures are recommended to mitigate such impacts, no structural upgrade of the bus and taxi facility to provide for predicted additional numbers is required.

Special arrangements (i.e. an additional off-site bus loading point) may need to be implemented during the infrequent occasions of Voyager class ship docking. The majority of ship scenarios in the Regal, Vista and Grand ship classes would require in the order of 35 buses and 26 taxis to be accommodated. Based on these scenarios infrastructure upgrades would not be warranted, however, a more streamlined operation will be required to fully utilise the existing facilities (refer to **Section B14.11.1**).

It should be noted that a large number of different destination points exist for the bus and taxi services as, due to the large number of tourist attractions and tourist locations there is a wide spread of bus and taxi travel routes. Consequently the impact of the bus and taxi services has a negligible impact to the wider road network.

When assessed against the significance criteria outlined in **Section B14.9**, the impact of the development on the bus and taxi provisions would be considered minor with an overall low risk of residual impact predicted (refer to **Table B14.12.3.3a**). Whilst no physical upgrades are triggered, minor upgrades to operational strategies are required.

B14.10.4 Pedestrian links

It should be noted that all existing pedestrian links are expected to remain unchanged as part of the project. Safe pedestrian crossing facilities will be maintained at the Wharf Street/Lake Street/Access intersection and the Wharf Street/Abbott Street/Car Park Access intersection. Both these intersections have signalised pedestrian crossings on all intersection legs. The high amenity and variety of destinations of these pedestrian links will continue to result in an even spread of pedestrians amongst these available routes, whilst cruise ships are docked.

Based on the operation of the facility the existing pedestrian facilities are sufficient to cater to any increased demand. However, with an increased passenger demand there is the potential for increased conflict of pedestrians with buses and taxis using the pick-up facilities. Consequently, some mitigation strategies should be considered.

Land-side works will be relatively minor - any hazard and risks associated with public access to work sites is addressed in **Chapter B17, Hazard and Risk**. Given the minor nature of land-side works, temporary access paths from road/rail reserves will not be provided. Existing routes will be suitable; therefore no decommissioning will be required.

When assessed against the significance criteria outlined in the baseline chapter, the impact of the development on the pedestrian links would be considered moderate with an overall medium risk to pedestrian conflicts in the vicinity of the CCLT (refer to **Table B14.12.3.3a**).

B14.10.5 Service Vehicles

The existing service vehicle arrangements would continue as part of the project as per the current operation. Consequently the upgrade of any service facilities is not warranted and no mitigation measures would be required.

When assessed against the significance criteria outlined in the baseline chapter, the impact of the development on service vehicles would be considered negligible.

B14.10.6 Car Parking Arrangements

No upgrades to the existing car parking arrangements or provision are proposed as part of the project. As the Port of Cairns is not a significant origin or destination port, cruise ship passengers do not have their own means of vehicular transport and most passengers utilise buses and taxis or walk to experience the city. Consequently the parking demand is minimal and the existing car park facility is adequate for demand.

When assessed against the significance criteria outlined in the baseline chapter, the impact of the development on car parking would be considered negligible.

B14.10.7 Yorkeys Knob

A number of existing impacts at the Yorkeys Knob Boating Club and Half Moon Bay Marina were identified and discussed in **Section B14.8**. With increased access for larger ships at the CCLT the current demand for cruise ship loading / unloading at the Yorkeys Knob Boating Club and Half Moon Bay Marina will be significantly reduced. Consequently, the impact to the Yorkeys Knob traffic conditions will be improved as significantly fewer ships are required to load and unload.

When assessed against the significance criteria outlined in the baseline chapter, the impact of the proposed development on Yorkeys Knob traffic conditions would be considered beneficial.

B14.10.8 Summary

While the transport chapter predicts that impacts to transport are negligible to low, with no construction impacts identified, the chapter details minor mitigation measures that will be applied when cruise ships are in port e.g. traffic controller. It is not considered necessary to prepare a road-use management plan or to prepare conditions of approval. Nevertheless, a Traffic Management Plan will be prepared prior to construction.

B14.11 Mitigation Strategy

B14.11.1 Bus and Taxi Provision

Proposed management measures to streamline bus and taxi operations include:

- Provision of a bus waiting facility/collection point in close proximity to the site to allow for efficient changeover of buses in the loading area
- Specific communication between the tour operations manager and the waiting buses to expedite bus changeover
- Provision of a traffic controller on the shared pedestrian area during heavy pedestrian movements to increase safety and give buses and taxis priority when required. The traffic controller could also be utilised as the taxi rank coordinator to ensure efficient use of the existing taxi facility
- More efficient planning and strategy for loading of passengers into tour buses including better signage and awareness reducing wait time
- Increased passenger awareness and information of exact schedule of bus departure.

B14.11.2 Pedestrian Links

Based on increased pedestrian numbers and potential increased conflict with buses and taxis using the pick-up facilities, some minor modifications will be implemented to increase the safety and efficiency of the pedestrian facilities. These proposed measures include:

- Provide a traffic controller on the shared pedestrian facility during times of heavy pedestrian movements to safely control vehicular and pedestrian conflicts
- Removal/relocation of the bench seats located adjacent to the existing shared pedestrian area (see **Figure B14.11.2a**) to improve sightlines and reduce the likelihood for pedestrians to congregate adjacent to/on the roadway.

Figure B14.11.2a Bench Seat Located on Major Pedestrian Link



B14.12 Construction Traffic

This section addresses the potential traffic generation and impact associated with the construction activities of the project.

The construction activities for the project will consist of channel dredging activities and land-side infrastructure construction. As the channel dredging is the largest construction activity associated with the project, this will occur as soon as possible after the pre-construction phase is completed. Construction associated with the wharf and land-side services will occur simultaneously to the channel dredging. Further information regarding the construction works are provided in **Chapter A4, Project Description**.

This section addresses only the traffic generation and construction activity that impacts on the existing land-side traffic elements and road network.

B14.12.1 Wharf Upgrade Construction

It is envisaged that the berthing structures will be constructed using land-based equipment except for the northern structure, which will be constructed from a barge.

The construction period for the wharf upgrade will be approximately seven to eight months. It is expected that construction will require approximately seven concrete trucks per berthing structure with a maximum of three daily movements for in-situ concrete pours over a period of approximately three days per berthing structure.

The workforce required to complete the wharf upgrade is estimated at approximately 30 personnel (full time on-site) and may vary slightly depending on how many work fronts are engaged and the program of works.

B14.12.2 Land-side Infrastructure Construction

The land-side infrastructure upgrades will consist of upgrades to the intermediate fuel oil, sewerage, potable water and fire fighting services.

These land-side infrastructure works are expected to take approximately eight to 10 months and will be undertaken simultaneously with the wharf upgrade.

It is expected that approximately four rigid dump trucks/concrete trucks will be required per day for the construction of the land-side infrastructure upgrades.

Land-side infrastructure works are estimated to require approximately 60 personnel (full time on-site).

B14.12.3 Construction Traffic Generation

B14.12.3.1 Passenger Vehicles

To provide a conservative assessment it has been assumed that all workers will travel to/from the project construction site via passenger vehicles.

It should be noted that the majority of construction staff travelling to the project construction site by passenger vehicle are expected to travel in groups, based on the fact that a number of staff will be short-term stays and are likely to car pool with contractor work vehicles. To determine the total number of passenger vehicles used to facilitate the project construction, the expected vehicle occupancy must be considered.

It has been assumed that vehicle occupancy of 1.5 people per passenger vehicle is appropriate. **Table B14.12.3.1a** below show the expected number of daily passenger vehicles that will visit the project site to facilitate construction.

Table B14.12.3.1a Expected Passenger Vehicle Numbers

Passenger Vehicle Type	People	Vehicle Occupancy	Vehicle Number
Construction Personnel Wharf Upgrade	30	1.5	20
Construction Personnel Land-side	60	1.5	40
		Total	60

A total of 60 passenger vehicles can be expected to travel to/from the project daily during construction.

B14.12.3.2 Construction Vehicles

It is estimated that a daily maximum of three concrete trucks will be required for the wharf upgrade construction and a daily total of four rigid dump trucks/concrete trucks will be required for the landside infrastructure construction.

Table B14.12.3.2a below show the expected number of daily dump trucks/concrete trucks that will be required to visit the project site to facilitate construction.

Table B14.12.3.2a Expected Dump/Concrete Truck Numbers

Construction Vehicle Type	Vehicles Daily
Wharf Concrete	3
Land-side Infrastructure Dump Truck/Concrete	4
Total	7

A total of seven dump/concrete trucks can be expected to travel to/from the project daily during construction.

B14.12.3.3 Impact

Passenger Vehicles

A total of 60 passenger vehicles can be expected to travel to/from the project daily during construction.

The proposed hours of construction will be standard construction hours of 6:30am to 6:30pm Monday to Saturday. Consequently the passenger vehicles trips to/from the project will occur well outside the network peak periods and have a negligible impact on the external road network.

Sufficient parking space is available for all 60 vehicles located in the existing CCLT and the vacant Ports North space located south of Whites Shed. Consequently the passenger vehicle parking can be easily accommodated and no temporary measures will be required.

Construction Vehicles

A total of seven dump/concrete trucks can be expected to travel to/from the project daily during construction. These trucks will travel to/from the project outside of the network peak period. Consequently the impact to the road network is estimated to be negligible.

B14.13 Residual Assessment Summary

Based on the assessment documented in **Section B14.10**, the additional traffic generated by the proposed development is expected to be minimal. The assessment results showed that the surrounding road network and critical intersection can accommodate the expected 2016 design traffic volumes, with the intersection capacity analysis showing significant spare capacity to cater for potential background traffic future growth at the Wharf Street, Lake Street and Port Access Road intersection.

The conducted calculations and site investigations within the study area (during cruise ship docking) indicate that the land-side infrastructure is sufficient to cater for the existing demand (both current and projected) and no upgrades are required. The project will assist in improving parking and potential safety issues at Yorkeys Knob docking facility, as this will be used less regularly by larger cruise ships.

A summary of the potential impacts and mitigation measures, together with the predicted residual impacts are provided in **Table B14.12.3.3a**.

Table B14.12.3.3a Assessment summary of Impacts, Risks and Mitigation Measures.

Value/ Element	Potential Impact	Significance Rating	Likelihood of Impact	Risk Rating Before Mitigation	Summary of Key Mitigation Measure	Residual Risk
Wharf Street/ Lake Street/ Port Access Intersection	Reduction of capacity at the intersection	Minor	Unlikely	Low	Not required	Low
Bus and Taxi Provision	Insufficient facilities	Minor	Likely	Medium	Operational Strategies to Streamline Operations	Low
Pedestrian Links	Pedestrian Safety	Moderate	Likely	Medium	Traffic Controller Removal of Seat Adjacent to Roadway	Low
Service Vehicles	Insufficient Provisions/ Access	Negligible	Unlikely	Negligible	Not required	Negligible
Car Parking Arrangement	Insufficient Car Parking Provision	Negligible	Unlikely	Negligible	Not required	Negligible
Yorkeys Knob Traffic Conditions	Unsafe/ Inappropriate Traffic Facilities	Beneficial	Highly Unlikely	Low Beneficial	Not required	Low Beneficial
Construction	Upgrades required to traffic infrastructure	Negligible	Unlikely	Negligible	Not required	Negligible

B14.14 References

Austrroads, *Guide to Traffic Management Part 12 Traffic Impacts of Development 2009*, Published by Austrroads Incorporated, Sydney

GHD. Cityport South Masterplanning Traffic Engineering Report , 2007.

The State of Queensland (Department of Main Roads), *Guidelines for Assessment of Road Impacts of Development, 2006*

B14.15 Glossary

Degree of Saturation (%) – This is the ratio of demand flow to capacity

Average Delay (sec) – The average delay per vehicle in seconds incurred by vehicles over the modelled time period

95th percentile Queue – A queue length measured in metres for which only 5 percent of queues are equal to or greater than

CRC – Cairns Regional Council

TMR – Department of Transport and Main Roads