FLANAGAN CONSULTING GROUP
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Ports North

CAIRNS SHIPPING DEVELOPMENT PROJECT

Revised Draft Environmental Impact Statement

Chapter B14: Transport

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B14.1 Introduction

Far North Queensland Ports Corporation Limited (trading as Ports North), seek to develop the proposed Cairns Shipping Development Project (henceforth known 'the project' or 'the CSD Project') at the Port of Cairns. The project comprises dredging a wider and deeper entrance channel to allow port access for larger cruise ships and upgrading berth infrastructure within Trinity Inlet. The dredging operations involve the removal of in-situ sediment material from within and adjacent to the existing shipping channel and placement at suitable land placement sites.

This Revised Draft Environment Impact Statement (EIS) assesses the environmental, social and economic impacts associated with the project' and this chapter, documents the existing traffic and transport conditions before establishment and operation of the proposed land based placement of the dredged material and assesses the potential impacts of the land based placement on the existing road network and transport infrastructure.

The Draft EIS (November 2014) Chapter B14 considered the traffic and transport issues associated with the wharf redevelopment construction, transportation of cruise ship passengers and deliveries to the Cairns Cruise Liner Terminal (CCLT).

The traffic and transport impacts of the land based placement of dredged material, and the impacts of the wharf upgrade and cruise ship operations are unrelated and separated in time Consequently Chapter B 14 of the Draft EIS (November 14) remains current and relevant in relation wharf redevelopment and cruise ship passenger transport issues.

B14.2 Assessment of Traffic/Transport Impacts

B14.2.1 Methodology

The methodology for the dredge operation transport impact assessment is based upon the Department of Transport 2006 'Guidelines for Assessment of Road Impacts of Development' (GARID). In general terms, GARID requires that transport impacts be assessed on the basis of:

- Identifying the critical transport infrastructure and facilities that the project is likely to impact
- Identification of the timeline at which the project is likely to commence construction and operation (Year 0) and a 10 year (design year) planning horizon (Year 10)
- A technical assessment of the baseline functionality and performance of the critical transport infrastructure in the absence of the project at Year 0 and Year 10
- Establish the traffic and transport demands generated by the project that will place demands on the existing transport infrastructure during construction and operations. (This will include cars, delivery trucks/vans, public transport, pedestrians and cyclists.)
- Determine if the additional demands trigger the threshold nominated by GARID that requires detailed assessment of impacts. (i.e. 5% increase in transport demands).
- On the basis that the trigger is achieved, overlay the project transport demands over the baseline demands at year 0 and Year 10.
- A technical assessment of the 'baseline + project' functionality and performance of the critical transport infrastructure at Year 0 and Year 10.
- Assess the incremental impact of the project on the critical transport infrastructure at Year 0 and Year 10.
- Develop a risk matrix that identifies those impacts that materially affect the transport network.
- Develop mitigation strategies that will offset the incremental impact. (This may be through changing the project to reduce the transport demands or upgrading infrastructure to cater for the project demand.)

B14.2.2 Assumptions and Technical Limitations

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

- There are no significant planned upgrades to the local or state transport network, other than Ray Jones Drive which is scheduled for upgrade to 6 lanes from July 2018. This has been confirmed with discussions with CRC's and TMR on 21 April 2017.
- Baseline traffic volumes on the surrounding state road network were determined using data from the Qld Globe plug-in to Google Earth which details 2015 traffic count data on the State Road Network.
- Local road network baseline traffic counts were derived from data supplied by CRC in 2014.
- Baseline traffic data and analysis utilised for the Aquis Integrated Resort TIA in 2014/15 continues to represent the existing operational conditions on the Captain Cook Highway, Yorkeys Knob Road and Holloways Beach Road.
- All dredging establishment, operation and disestablishment data has been extracted from technical reports contained in **Appendices AA**, **AC** and **Z**.

B14.2.3 Policy Context and Legislative Framework

The development of this chapter includes reference to all 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.
- The 2009 Austroads Guide to Traffic Management (Part 12 Traffic Impacts of Development) provides standards for the assessment of traffic impacts.

B14.2.4 Baseline and Design Year

As the dredging and land based placement is a discrete and defined event, the Baseline (Year 0) and Design Year (Year 10) for the purpose of assessing traffic and transport impacts are in effect the same.

It is proposed to undertake the dredging of the Port of Cairns in 2019 over a 24 week duration including establishment, operations and disestablishment.

B14.2.5 Study Area

It is proposed to dredge 'soft' and 'firm' clay materials from the Cairns inlet. The dredged materials are proposed to be placed at two sites referred to as the Portsmith (Tingira Street) DMPA for the stiff clays and Barron Delta (Northern Sands) DMPA for the soft clays.

Figure B14-1 illustrates the relative positioning of the DMPAs.

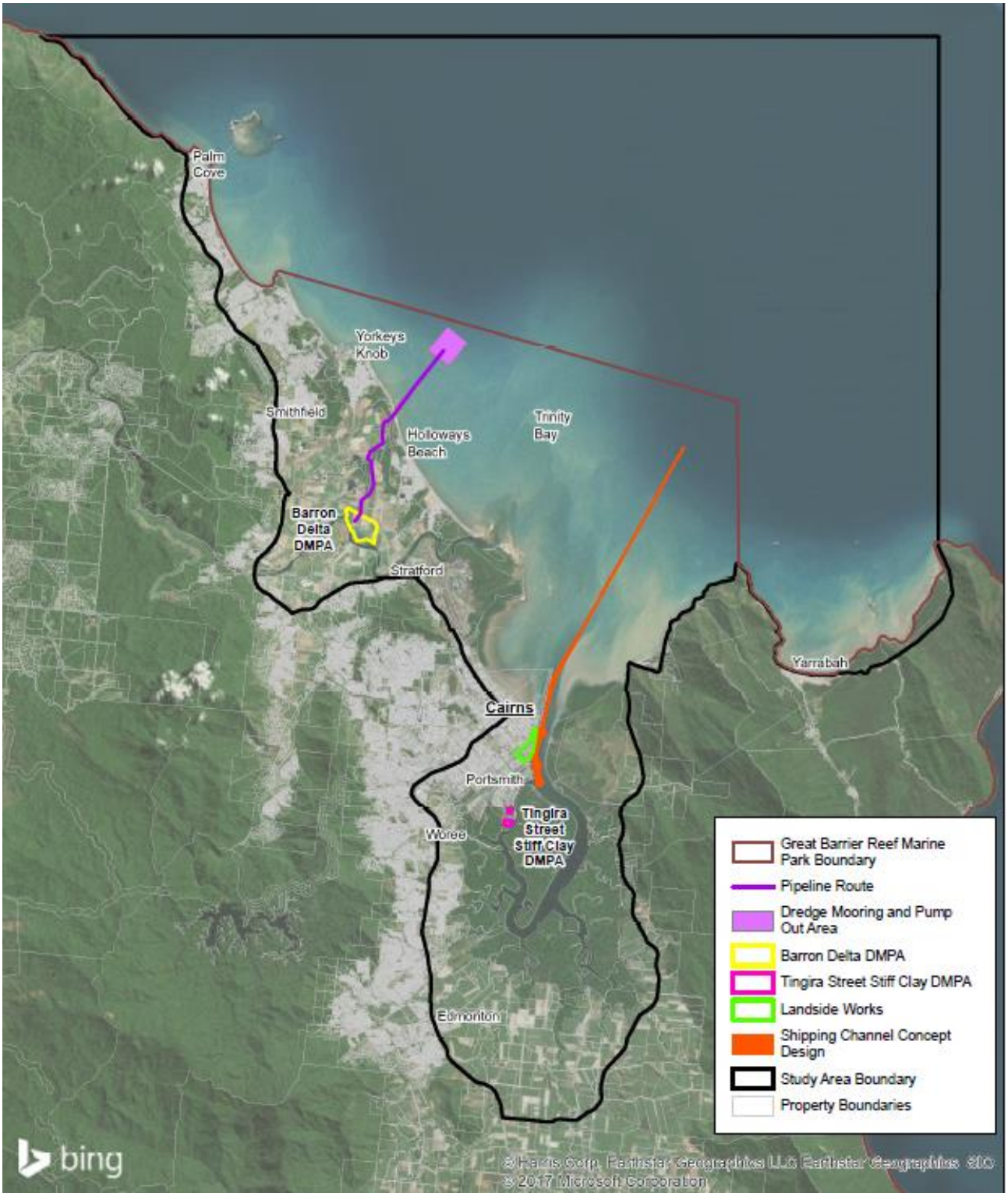


Figure B14-1 Land-based dredge material placement sites.

B14.2.5.a Portsmith (Tingira Street) DMPA

The Tingira Street Site will receive 100 000 m^3 of dredged stiff clay materials that will be delivered by barge direct to the site. The material will be retained and used on the site as landfill and surcharge to facilitate further commercial development in the area.

Figure B14-2 provides an aerial view of the proposed Tingira Street DMPAs and the road network proximal to the site.

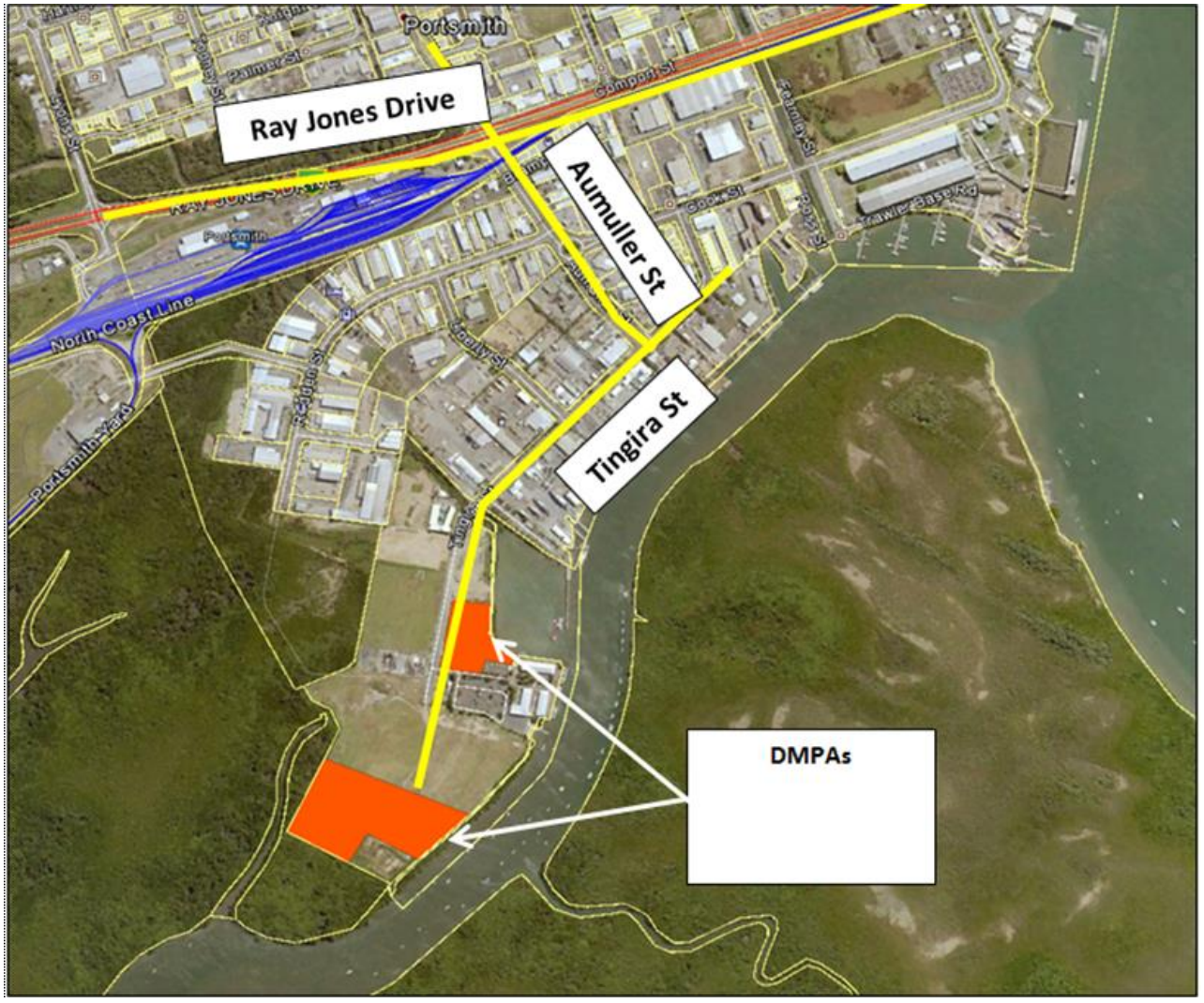


Figure B14-2 Tingira Street DMPAs.

B14.2.5.b Barron Delta (Northern Sands) DMPA

The Northern Sands DMPA will receive 900 000 m^3 of dredged soft clay materials that will be delivered by pipeline direct to the site. The material will be retained and used as fill to consume space left from historic sand mining industry. The pipeline will be aligned on a route between Holloways Beach and Northern Sands as shown on **Figure B14-3**.

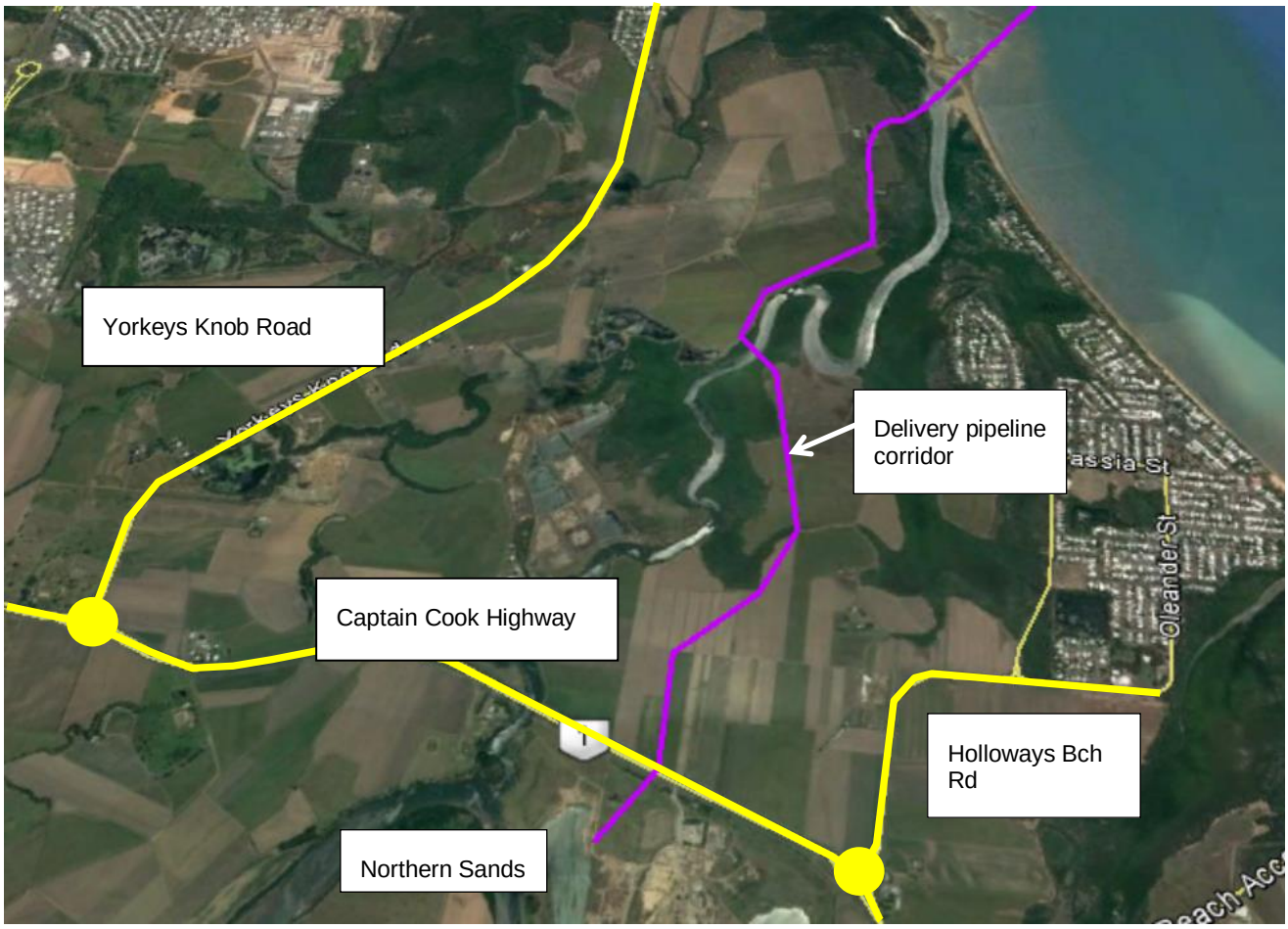


Figure B14-3 Northern Sands DMPA and delivery pipeline corridor.

B14.2.6 Impact Assessment Process

In order to establish the relativity of impacts and the associated risk of an impact arising on the transport network, 'consequence criteria' were developed which describe how impacts influence the network. **Table B14-1** shows the consequence criteria developed for transport impacts.

TABLE B14-1 SIGNIFICANCE CRITERIA

CONSEQUENCE	CRITERIA
Very High	Traffic significantly exceeds acceptable levels of operation (degree of saturation 90 percent) or generates a substantially unsafe outcome, requiring substantial upgrade of the road network.
High	Traffic exceeds acceptable levels of operation (degree of saturation 90 percent) or generates a substantially unsafe outcome, requiring substantial upgrade of the road network.
Moderate	Traffic slightly exceeds acceptable levels of operation (degree of saturation 90 percent) or generates a moderately unsafe outcome, requiring some level of upgrade to the road network.
Minor	Impact on traffic recognisable but acceptable (degree of saturation 90 percent) or generates an unsafe outcome that can be moderated with industry standard management procedures, with no upgrade to the road network required. Temporary loss of access or road closures required. Management of traffic through use of traffic controllers. Impact to traffic conditions based on construction is recognisable but acceptable.

CONSEQUENCE	CRITERIA
Negligible	No change to existing traffic conditions. No loss of access or road closure. No increase in safety risk.
Positive	Improved traffic conditions, better safety outcome.

Subsequent to the allocation of consequence to an identified impact, an assessment is made as to the duration of that impact. **Table B14-2** shows the general approach to the classification of duration of identified impacts.

TABLE B14-2 RELATIVE DURATION OF IMPACTS

RELATIVE DURATION OF IMPACTS CRITERIA	
Temporary	Days to Months
Short Term	Up to one year
Medium Term	From one to five Years
Long Term	From five to 50 Years
Permanent / Irreversible	In excess of 50 Years

In assigning a 'risk rating' to an impact, the significance of a 'risk' is weighed up against the 'likelihood' of that impact occurring.

Table B14-3 provides definitions of likelihood of an impact.

TABLE B14-3 CLASSIFICATION OF IMPACT DURATION

Likelihood of Impacts	Risk Probability Categories
Highly Unlikely	Highly unlikely to occur but theoretically possible
Unlikely	May occur during construction of the project but probability well below 50%; unlikely, but not negligible
Possible	Less likely than not but still appreciable; probability of about 50%
Likely	Likely to occur during construction or during a 12 month timeframe; probability greater than 50%
Almost Certain	Very likely to occur as a result of the proposed project construction and/or operations; could occur multiple times during relevant impacting period

A risk rating is assigned by assessing consequence versus likelihood within a risk matrix with up to six levels of risk (Negligible, Low, Medium, High, Very High or Extreme) possible. Risk is described as the product of likelihood and consequence as shown in **Table B14-4** below.

TABLE B14-4 RISK MATRIX

LIKELIHOOD	CONSEQUENCE				
	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

The rating of risk as assessed above is further described as shown in **Table B14-5** below.

TABLE B14-5 RISK DESCRIPTIONS

Extreme Risk	An issue requiring change in project scope; almost certain to result in a 'significant' impact on a Matter of National or State Enviro 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

Those risks that are defined as 'Extreme, High or Medium' require further detailed assessment as to project specific mitigation strategies to be adopted.

B14.3 Land-based Wharf Redevelopment and Cruise Ship Traffic Impacts

B14.3.1 Introduction

The traffic impact assessment undertaken by ARUP in 2014 for the traffic and transport issues associated with the wharf redevelopment construction, transportation of cruise ship passengers and deliveries to the Cairns Cruise Liner Terminal (CCLT) identified the key traffic generators and the associated impacts during the redevelopment construction and docking of Voyager class vessels visiting Cairns. This assessment was undertaken across 2 sites, the Cairns Cruise Liner Terminal (including two intersections; Signalised Lake Street/Wharf Street/Port Access and unsignalised Wharf Street/Port Access), and Half-moon Bay Marina at Yorkeys Knob.

B14.3.2 Wharf Redevelopment Construction Impacts

The reconstruction works are required for the Cairns Cruise Liner Terminal only and the draft EIS identified an 8 to 10 month construction programme that would generate 60 passenger vehicle and 7 construction vehicle trips per day during this period.

The analysis identified that these movements were likely to happen outside the network peak periods and will have negligible impact on the external road network. The CCLT and Ports North space located south of Whites Shed can accommodate carparking needs with no additional carparking is required.

B14.3.2.a Passenger Transportation Impacts

CCLT passenger and supply traffic generated impacts were assessed to determine impacts on critical elements of the transport network including:-

- 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.

To determine impacts, passenger data from the Voyager class ship likely to visit Cairns was used to establish ‘project traffic’. This was overlayed onto the background traffic for a design horizon from 2016 (Year 0) to 2026 (Year 10) to establish a basis for the determination of traffic impacts. Bus and taxi data from known visiting ships was extrapolated to represent numbers required for the Voyager class vessels, as well as, Regal, Vista and Grand class vessels. The TIA established that there were negligible impacts on the transport network arising from Voyager Class operations.

The revised project has determined that the largest vessels to use the CCLT will be a Vista and Grand class vessels which have passenger capacity up to approximately 3200, This compares with the approximately 5000 passengers for Voyager class vessels formed the basis of the traffic impact assessment in the Draft EIS to 3173 for the Vista. It is evident that the transport impacts identified in the previous impact assessment will exceed the anticipated impacts from the smaller capacity vessels the CSDP will cater for.

B14.3.2.b Cairns Cruise Liner Terminal

The analysis undertaken for the signalised Lake Street/Wharf Street/Port Access and unsignalised Wharf Street/Port Access, connecting the CCLT to the external transport network, determined that the intersections would operate within acceptable limits of operation with a degree of saturation below 90% for the design year and at the 10 year horizon.

Bus and taxi numbers interpolated for the Vista and Grand class vessels determined impacts of the development on the bus and taxi provisions to be minor with an overall low risk of residual impact. The numerous and varied destinations for bus and taxi services, associated with the geographically spread hotels, tourist sites and attractions spread throughout the region, will significantly redistribute travel routes and make public transport impacts on the wider road network negligible. The assessment further identified that no infrastructure upgrades are required within the CCLT, however, a more streamlined operation will be required to fully utilise the existing terminal facilities.

The existing pedestrian links are expected to remain unchanged with safe pedestrian crossing facilities at the main intersections at Wharf Street/ Abbott Street/Port Access and Wharf Street/ Abbott Street/Carpark Access. Both intersections have signalised pedestrian crossings. The existing internal pedestrian facilities are also considered sufficient to cater to any increased demand, however, there is a potential for increased conflict of pedestrians with buses and taxis using the pick-up facilities. Temporary access paths from road/rail reserves will not be required as the existing routes will be suitable during any land-side upgrade works. The impact of the development on the pedestrian links was considered moderate with an overall medium risk to pedestrian conflicts in the vicinity of the CCLT.

B14.3.3 Mitigation Strategies

B14.3.3.a 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.

B14.3.3.b 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 to improve sightlines and reduce the likelihood for pedestrians to congregate adjacent to/on the roadway.

B14.3.4 Supply Delivery Impacts

Service vehicle operations will continue as per current operations and are considered to have negligible impact.

B14.4 Yorkeys Knob

The revised scope of the proposed dredging of the Cairns shipping channel will continue to result in the need for the larger cruise ships to continue to use the Yorkeys Knob Boating Club and Half Moon Bay Marina for transporting passengers into Cairns.

At Yorkeys Knob 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. 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 not increase significantly. Consequently, the impact to the Yorkeys Knob traffic conditions will remain unchanged. The impact of the proposed development on Yorkeys Knob traffic conditions are considered negligible.

B14.5 Dredging

B14.5.1 Establishment and Operation

The dredging plant is highly specialised ocean going vessels and will be established in the Cairns Inlet by sea. Dredging crews will be operating in the Cairns Inlet on a live-aboard 2 week rotation. The dredging requires non-Cairns based crews to operate the plant and it is envisaged that the shift changeover will require transport of crews to and from the airport.

The stiff clay dredging operation requires a 32 man workforce and the soft clay operation a 48 man workforce. Each operation will generate a maximum of 1 bus trip per shift change. The shift change has been nominated to take place at the Marlin Wharf, where a coach will deliver the fresh crew to the wharf and pick up the departing crew for transfer to Cairns Airport.

It is anticipated re-supply and rubbish removal will take place at each shift change generating a maximum of 1 Supply and 1 Waste Heavy Vehicle Trip per swing change.

B14.5.2 Existing Network

The movement of workers at shift changes will be conveyed by road between Marlin Wharf and the Cairns Airport. The route is anticipated to be via Spence, Lake Streets and Airport Avenue. The route currently caters for movement of tour busses, public transport and private vehicles that convey several thousand tourists and visitors to and from Cairns each day.

B14.5.3 Potential Transport/Traffic Demands

As noted above the dredging vessels will bought to Cairns by sea and will not generate terrestrial transport related demands.

The transfer of workers that will operate the dredges and supporting equipment will fly in/out of Cairns and will result in up to 2 bus movements every two weeks.

B14.5.4 Impact Assessment and Mitigation

Two additional coaches on the network every two weeks will be negligible relative to the volume of traffic movements on the existing network. Spence Street, Lake Street and Airport Avenue re configured to cater for the safe movement of passenger coaches. Hence the impact on the existing network arising from the dredge operations is considered to be negligible.

Table B14-6 summarises the risk rating for each of the impacted transport elements arising from the operation of the dredging plant.

TABLE B14-6 DREDGING IMPACT RISK ASSESSMENT

VALUE/ ELEMENT	POTENTIAL IMPACT	CONSEQUENCE RATING	LIKELIHOOD OF IMPACT	RISK RATING BEFORE MITIGATION	SUMMARY OF KEY MITIGATION MEASURE	RESIDUAL RISK
Spence Street	Reduction of capacity	Negligible	Unlikely	Negligible	Not required	Negligible
Lake Street	Reduction of capacity	Negligible	Unlikely	Negligible	Not required	Negligible
Airport Avenue	Reduction of capacity	Negligible	Unlikely	Negligible	Not required	Negligible

The presence of two additional bus movements on the Spence, Lake, Airport Avenue route each 2 week shift swing change will have negligible impact on the route.

B14.6 Dredge Material Delivery Pipeline

B14.6.1 Establishment, Operation and Disestablishment

The pipeline infrastructure and site works to be established for the dredged material pipeline comprises of the construction of 3 x 0.5ha laydown facilities with a 6 man workforce working a 12 hour day shift/7 days a week, situated at:

- Sea based laydown yard at Richters Creek
- Land based laydown yard at Richters Creek
- Land based laydown yard at Yamaji Property.

Approximately 9.7 km of pipelines is to be laid from the sea based booster to Northern Sands Quarry (and a return water pipeline to the Barron River) with a 31 man workforce (8/land-based site and 7/ocean-based site) working 12 hour day shift/7 days a week.

Figure B14-4 illustrates the proposed delivery pipeline corridor and booster pump laydown areas.

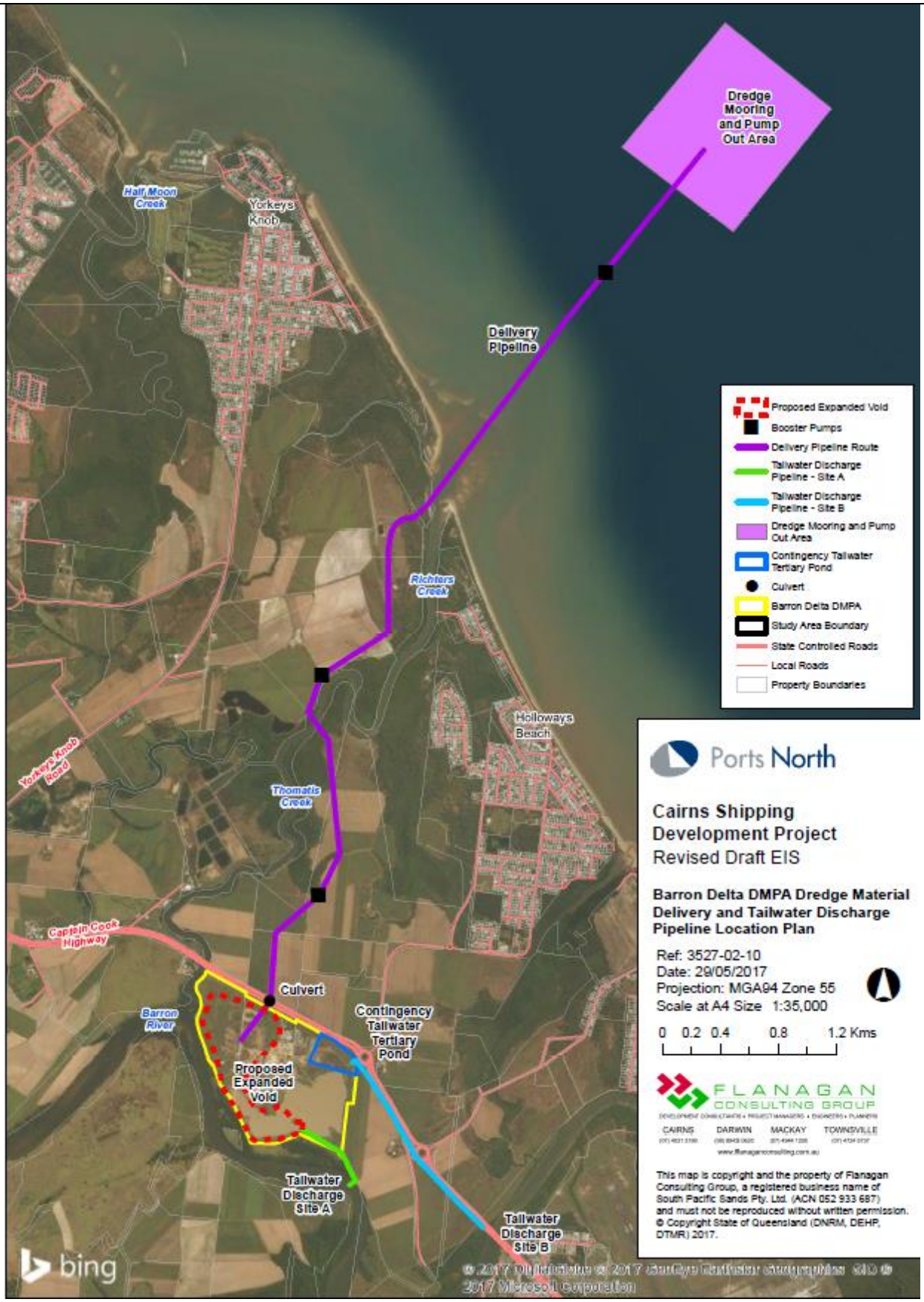


Figure B14-4 Delivery pipeline corridor.

The analysis has been broken up into two sections to reflect the traffic demands at the 3 different stages of the soft clay dredging operation; a 6 week establishment phase, 6 week disestablishment phase and 12 week dredge material placement phase.

B14.6.2 Existing Network

The proposed pipeline transport route of pipeline to the individual sites will be dependent on the successful haulage contractor. The transport route to each site can be from several potential alternative points of pickup including the Port (Tingira Street), rail depot, or by road from the south via the Bruce Highway. It is anticipated that 25 m B-double vehicles will be used for transport of the pipework.

Utilising the TMR Multi-combination Routes Maps for the Cairns region shown in **Figure B14-5** and **Figure B14-6** below, the proposed routes to each of the pipeline laydown sites have been determined based on the road suitability for 25 m B-double vehicles:-

- From Tingira Street Site to Richter Creek/Holloways Beach/Northern Sands inclusive - Tingira Street - Aumuller Street - Mulgrave Road - Sheridan Street - Captain Cook Highway - Holloways Beach Access Road/Yorkeys Knob Road
- From Rail Depot to Richter Creek/Holloways Beach/Northern Sands inclusive - Lyon Street - Southern Access(Ray Jones Drive) - Aumuller Street - Mulgrave Road - Sheridan Street - Captain Cook Highway - Holloways Beach Access Road/Yorkeys Knob Road
- From South (Bruce Highway) to Richter Creek/Holloways Beach/Northern Sands inclusive - Lyon Street - Southern Access(Ray Jones Drive) - Aumuller Street - Mulgrave Road - Sheridan Street - Captain Cook Highway - Holloways Beach Access Road/Yorkeys Knob Road

The proposed routes to each of the Tingira Street Ocean-based pipeline site have are:-

- From Rail Depot to Tingira Street - Lyon Street - Southern Access(Ray Jones Drive) - Aumuller Street – Tingira Street
- From South (Bruce Highway) to Tingira Street - Lyon Street - Southern Access(Ray Jones Drive) - Aumuller Street – Tingira Street

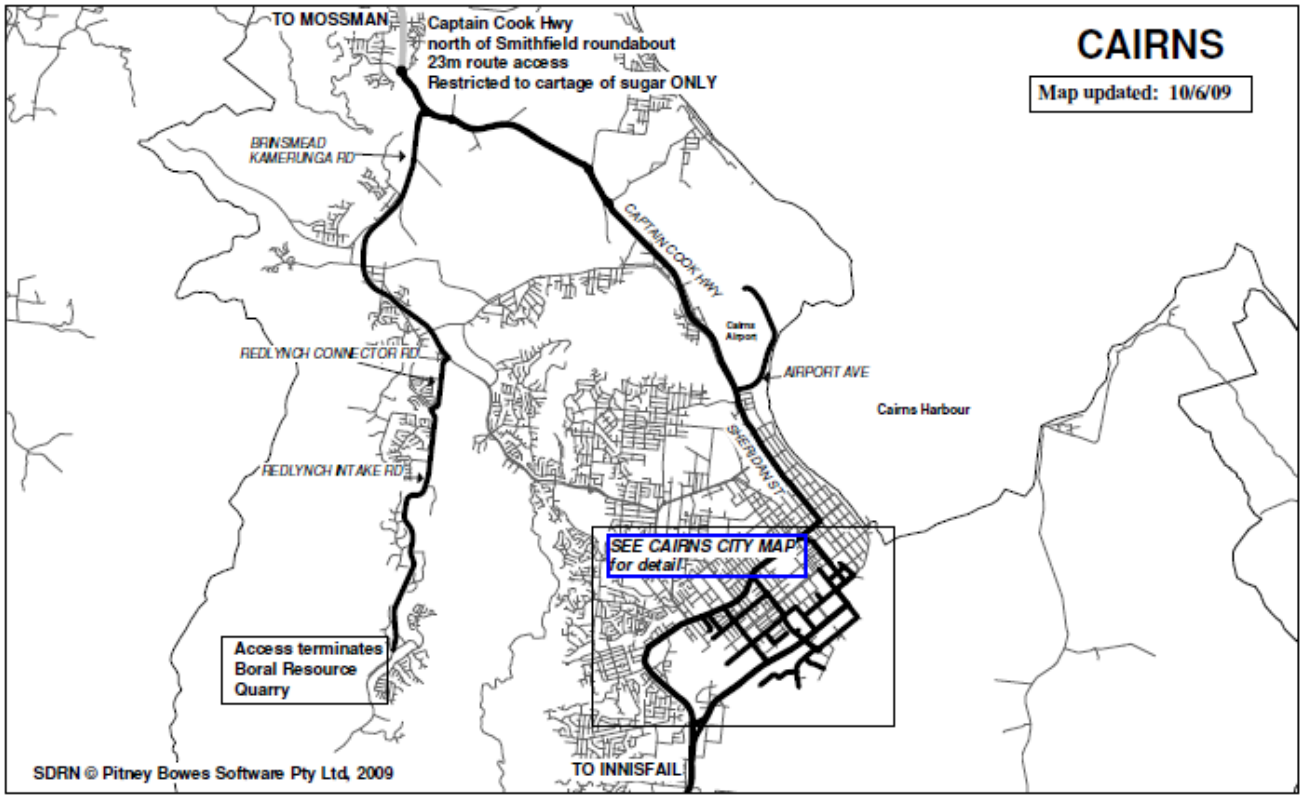


Figure B14-5 DTMR Multi-Combination Route – Cairns Region.

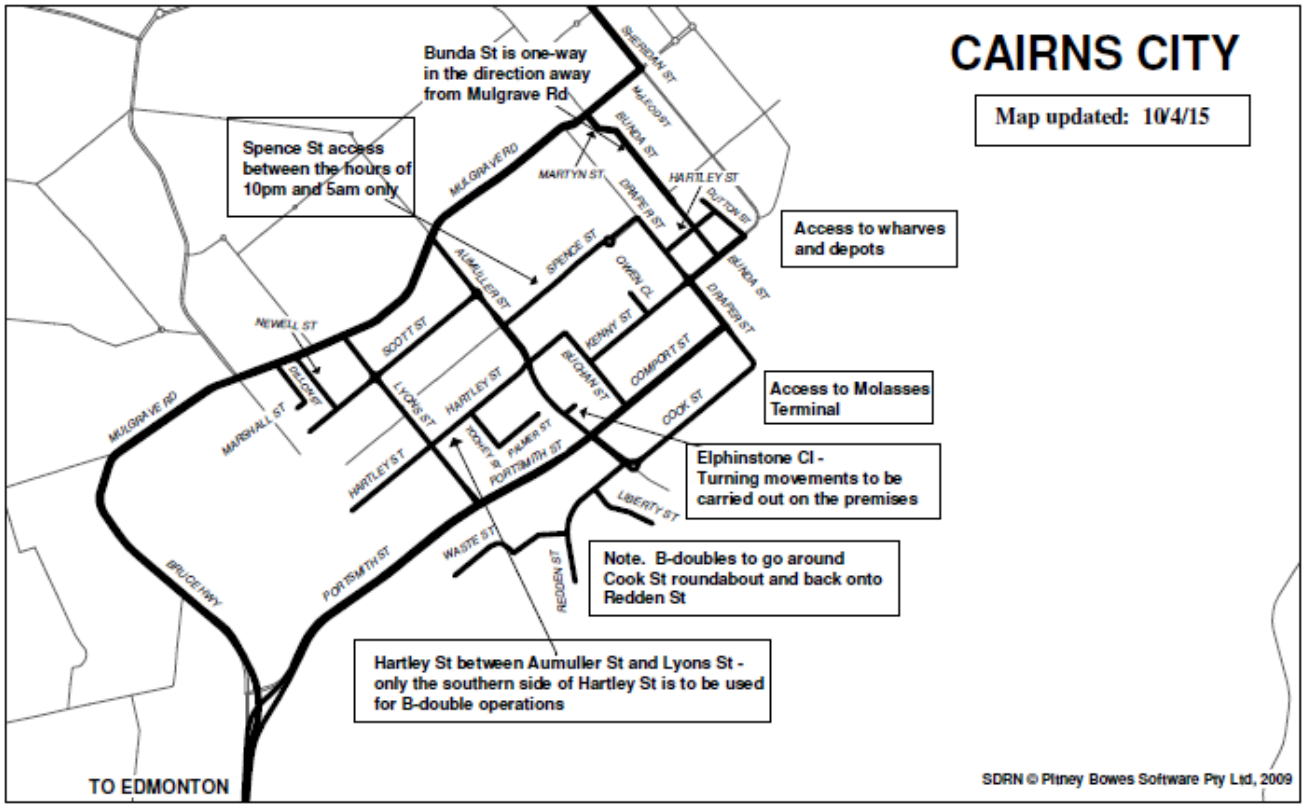


Figure B14-6 DTMR Multi-Combination Route – Cairns City.

Each of the road network elements on the potential haul routes is discussed below.

Ray Jones Drive (Bruce Highway) is the national freight route from the south of Queensland. It is configured as 4 lane divided. Ray Jones Drive / Comport Street is the terminating leg of the Bruce Highway at Draper Street, and provides a freight and commuter traffic conveyance function from regions and suburbs south of Cairns respectively. The link currently operates at a poor level of service and currently caters for the movement of 32 000 vehicles per day on the southern approach to Aumuller Street. The Department of Transport and Main Road have committed to initiating upgrade to 6 lanes from Kate Street to Aumuller Street from July 2018.

Tingira Street functions to cater for the local movement of commuter light vehicles and over-width heavy vehicles associated with the transfer of large vessels between the Chinaman Creek / Cairns Inlet and the surrounding maritime support services. It is fully constructed and configured to a pavement width of 16m from east of Aumuller Street to the public boat ramp adjacent to Queensland Transport. During week days its function is primarily associated with servicing industrial and commercial properties on the street frontage. Hence there is minimal traffic generation arising from customer or drive by trade and traffic generation is principally from employee movements. Norship Marine employs approximately 70 to 120 people and occupies approximately half of the street frontage south of Aumuller Street.

Other industries on the frontage include Sea Swift, Qld Fisheries and the Great Barrier Reef Marine College. Conservatively it is estimated these uses will attract approximately 400 employees / attendees. At a vehicle occupancy rate of 1.2 people per car, this equates to 335 vehicles movements in the AM and PM peak periods which are likely to be between 7 am – 8 am and 4 pm – 5 pm. In the context of a typical lane capacity at 900vph, current peak demands are likely to consume about 35% of existing capacity.

At the southern extents of the constructed portion of Tingira Street there is a public boat ramp which will typically experience peak demands during weekends and public holidays. The boat ramp facility provides for 150 car parks. Some car/boat/trailer combinations will consume 2 parking bays per boat. The practical capacity is estimated for cater for 100 cars/boat trailers at peak occupancy. On normal work days the demand would be relatively low.

Aumuller Street provides connectivity from Tingira Street to Ray Jones Drive (Bruce Highway). Aumuller Street is configured as a 2 lane divided configured configuration with kerb side parallel parking and parking in the centre median. Aumuller Street is the primary route for the conveyance of traffic associated with the commercial, industrial and maritime industries in Portsmith from greater Cairns and destinations to the south. Traffic count data sourced as part of the Kate to Aumuller 6 lane upgrade of Ray Jones Drive indicates ***Aumuller Street*** caters for approximately 12 000 vehicle movements a day and 800 vehicles per hour (bi-directional) in the AM peak, and is the primary access link between the Bruce Highway and the Portsmith estate.

Operating at 35% of theoretical capacity, ***Tingira Street*** does not suffer issues with respect to capacity, delay or queuing. Tingira Street experiences occasional slow movement of oversized loads for the movement of large vessels into adjacent ship yards. This event is relatively infrequent and is not coincident with normal commuter peaks.

Likewise, Aumuller Street is operating at approximately 50% of the theoretical capacity in the AM peak and does not suffer issues with respect to capacity, delay or queuing.

The intersection of Aumuller Street and Tingira Street is unsignalised and operates as a ‘T’ intersection. Whilst Aumuller Street conveys 12 000 vpd and 800 vph in the AM peak, these traffic movements quickly redistribute across the local street network onto Redden, Cook, Liberty and Tingira Streets. Hence traffic passing through the Aumuller / Tingira Streets intersection is similar to that experienced on Tingira Street estimated at 335 vph in the AM / PM peaks.

Sidra analysis established that the intersection currently operates at Level of Service A with maximum queue length on Aumuller Street of 6 m (refer summary in **Table B14-7** below.)

TABLE B14-7 SIDRA ANALYSIS – AUMULLER / TINGIRA INTERSECTION (2017)

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: Tingira West											
1	L2	47	0.0	0.047	5.5	LOS A	0.0	0.0	0.00	0.31	55.7
2	T1	42	0.0	0.047	0.0	LOS A	0.0	0.0	0.00	0.31	57.2
Approach		89	0.0	0.047	2.9	NA	0.0	0.0	0.00	0.31	56.4
North: Tingira East											
8	T1	74	0.0	0.052	0.1	LOS A	0.1	0.9	0.10	0.14	58.3
9	R2	23	0.0	0.052	5.7	LOS A	0.1	0.9	0.10	0.14	56.2
Approach		97	0.0	0.052	1.4	NA	0.1	0.9	0.10	0.14	57.8
West: Aumuller											
10	L2	93	0.0	0.228	5.7	LOS A	0.9	6.5	0.17	0.58	53.2
12	R2	189	0.0	0.228	6.2	LOS A	0.9	6.5	0.17	0.58	52.6
Approach		282	0.0	0.228	6.0	LOS A	0.9	6.5	0.17	0.58	52.8
All Vehicles		468	0.0	0.228	4.5	NA	0.9	6.5	0.12	0.44	54.5

Based on the above analysis, and observation, the Aumuller / Tingira Street intersection operates with a high level of service and minimal delay and queueing. The current TMR planning study on the Ray Jones Drive intersection with Aumuller Street established the intersection performs poorly at Level of Service E/F in the AM and PM peaks. This is typically associated with the high volume of movements on Ray Jones on the AM/PM peaks resulting in significant delay for traffic and entering/exiting Aumuller Street.

Mulgrave Road, between Aumuller Street and Sheridan Street is configured as 6 lane divided and conveys 26 000 vehicles per day (vpd) (2015 TMR census). Mulgrave Road is an urban arterial road that formally operated as the Bruce Highway before Ray Jones Drive was constructed in a 4 lane configuration in 2009. The link is estimated to typically operate at medium to high level of service in peak periods and does not experience significant queuing or delay in the peak commuter periods.

Sheridan Street between Mulgrave Road and Airport Avenue is configured in 4 and 6 lane divided arrangements. Sheridan Street carries between 27 000 vpd (near Mulgrave Road) and 37 000 vpd (south of Airport Avenue, North Cairns). The link is an urban arterial road that conveys traffic from the Captain Cook Highway to and from the Cairns CBD and inner suburbs. Sheridan Street experiences significant delay and queuing at the North Cairns end of the link (between James Street and Airport Avenue) during the AM and PM peak periods.

The **Captain Cook Highway** from Airport Avenue to Holloways / Yorkeys Knob Road intersections is a 4 lane divided rural arterial road which operates at 80 and 100 km/h posted speeds, interspersed by 40 km limits at roundabout intersections with Machans, Holloways and Yorkeys Knob Roads. The Captain Cook Highway is the primary route servicing the Northern Beaches of Cairns and further north and is configured to cater for the movement of large vehicles. The link carries nearly 40 000 vpd just north of Airport Avenue and this reduces to about 30 000 vpd at Yorkeys Knob Roundabout. The link daily experiences significant delays and queuing in the AM and PM peaks from Airport Avenue north to Machans Beach roundabout.

Holloways Beach and Yorkeys Knob Roads are local roads configured as 2 lanes 2 way that supports the movement of traffic from the local beach side communities to the Captain Cook Highway. The traffic is primarily commuter traffic generated by the beachside communities that access the Captain Cook Highway at 2 lane roundabouts. Holloways Beach Road is estimated to carry 6400 vpd and Yorkeys Knob Road, 6,800 vpd. The current 2 lane rural road configuration of the Yorkeys Knob and Holloways Beach Roads has sufficient capacity to meet current and future planned traffic demands. The geometry of the road is adequate to meet the operational and safety standards for the posted speed limit. The Cairns Regional Council town plan has not contemplated land uses that translate to significant growth in traffic volumes and has no plans to increase or augment capacity of the link in the context of lane capacity or geometry.

B14.6.3 Potential Transport/Traffic Demands

B14.6.3.a Pipeline Establishment and Disestablishment

The establishment and disestablishment phases for the pipeline have been assessed collectively as the operational requirements and associated traffic demands during these phases are fundamentally the same. There is several traffic generating activities to be undertaken during these phases across the 3 associated sites, including:-

- Delivery of the pipeline (12 m) sections during the establishment and disestablishment phases is to the three laydown areas/fabrication areas at:
  - via Yorkeys Knob Road to Pappalardo property for the marine and land pipeline segments north of Richters Creek up to the Creek crossing
  - via Holloways Beach Road to Yamaji Property; for the land based pipeline south of Richters Creek for the creek crossing to the Captain Cook Highway crossing
  - via Captain Cook Highway to the Northern Sands Quarry; for pipework internal to the DMPA and the tailwater discharge pipeline.
- Delivery of the land based pipe (12m) sections during the first 2 weeks of establishment and removal during the last 2 weeks of the disestablishment phase to either Tingira St Site or Yorkey's Knob Road to Pappalardo property.
- Floating in/ out for Franna and Wielder cranes, cribbing and ablutions and fencing to ocean-based pipeline laydown yard; 1 fuel truck daily for 6 weeks on 12 hr day shifts only.
- Floating in/out for Franna cranes, Backhoes and Flatbed Trucks, cribbing, ablutions and fencing to the land-based pipeline laydown yards at the Pappalardo and Yamaji properties; and fuel truck daily with a 6 week pipeline assembly on 12 hr day shifts.

The transport of the plant, cribbing and fencing to the sites will generate:

- a maximum of 8 heavy vehicle trips to the Pappalardo or Tingira St ocean-based pipeline site (4 during each phase)
- a maximum of 10 heavy vehicle trips to the Pappalardo and Yamaji land-based pipeline sites (5 during each phase).

The construction/decommissioning of each laydown site and the pipeline will generate a maximum of 32 to 33 light vehicle trips per day to the 3 sites over each 6 week period assuming a 1.5 person per vehicle occupancy. It is assumed that the construction activities would generate a maximum of 1 fuel and 1 waste heavy vehicle trip per day to each site over the 6 week period. **Table B14-8** below shows the site based traffic generated during this period.

TABLE B14-8 BARRON DELTA ESTABLISHMENT/DISESTABLISHMENT TRAFFIC GENERATION (EXCL. PIPELINE DELIVERY)

VEHICLE TYPE	TOTAL TRIPS (FOR 12 WEEKS)	AVERAGE DAILY TRIPS
Light Vehicles	2744	32 - 33
Heavy Vehicles	177	2 - 3

The transport of the pipeline and plant is anticipated to happen outside of peak traffic periods with appropriate controls and permits from Cairns Regional Council and the Department of Transport and Main Roads.

The pipeline haulage operation will generate 278 B-Double equivalent trips (139 Establishment/139 Disestablishment) for the land-based pipeline delivery/removal and 136 B-Double equivalent trips (68 Establishment/68 Disestablishment) for the ocean-based pipeline delivery/removal over a 2 week period during the establishment period and the disestablishment period. **Table B14-9** below shows the pipe haulage generated trips during this period.

TABLE B14-9 BARRON DELTA PIPELINE DELIVERY TRAFFIC GENERATION

DETAILS	SITE			
	Pappalardo Land-based (Captain Cook H'way - Yorkeys Knob Road)	Yamaji Land-based (Captain Cook H'way - Holloways Beach Road)	Northern Sands Land- based (Captain Cook Highway)	Pappalardo/Tingira St Ocean-Based (Captain Cook H'way - Yorkeys Knob Road)
Total Trips	93	93	93	136
Average Daily Trips	3 - 4	3 – 4	3 – 4	4 - 5

B14.6.3.b Pipeline Operation

The 12 week soft clay placement phase through the Booster Pump/Pipeline Network to the Northern Sand Quarry Site consists of drawing the soft clay from the Trailing Suction Hopper Dredge to the Booster Pump and pipeline and transferred to the placement pond at Northern Sands. The Northern Sands operational phase will be undertaken by a 6 man workforce working 2 x 12 hr shifts/day, 7 days a week which will generate a maximum of 8 light vehicle trips to the site per day assuming a 1.5 person per vehicle occupancy. It is also assumed that the placement activities would generate a maximum of 1 fuel and 1 waste heavy vehicle trip per day to the site over the 12 week period. A further fuel heavy vehicle and 1 maintenance light vehicle trip is proposed to service the land-based pumps and pipeline

Table B14-10 below shows the total traffic generated during this period.

TABLE B14-10 BARRON DELTA PLACEMENT OPERATION TRAFFIC GENERATION

VEHICLE TYPE	TOTAL TRIPS (12WKS)	AVERAGE DAILY TRIPS
Light Vehicles	769	9
Heavy Vehicles	255	3

The material placement activity is expected to have shift changeover at 6 – 7:00 am and 6 – 7:00 pm and the associated staff trip generation will be outside of the peak traffic periods. Refuelling and waste placement is expected to be a routine operation organised outside of the peak periods. All parking requirements are expected to be provided within the site having no impact on the surrounding road network.

B14.6.4 Impact Assessment and Mitigation

B14.6.4.a Traffic Generation and Haulage Route

The TMR 2006 *Guidelines for Assessment of Road Impacts of Development* (GARID) identifies that the need for assessment of impact on state road network is triggered where the development traffic generation is in excess of 5% of the baseline. **Table B14-11** summarise the traffic generation associated with the establishment, operation and disestablishment of the Barron delta pipeline on the transport network.

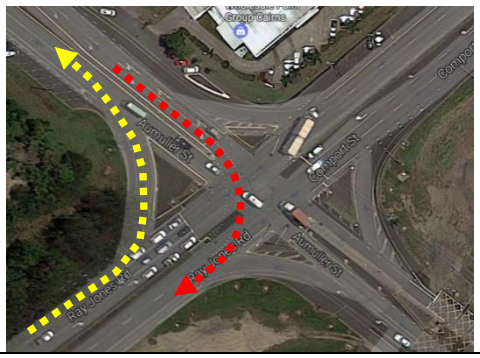
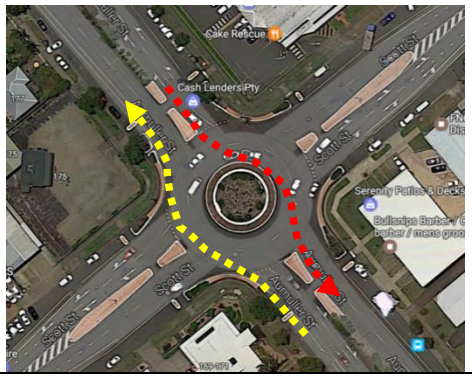
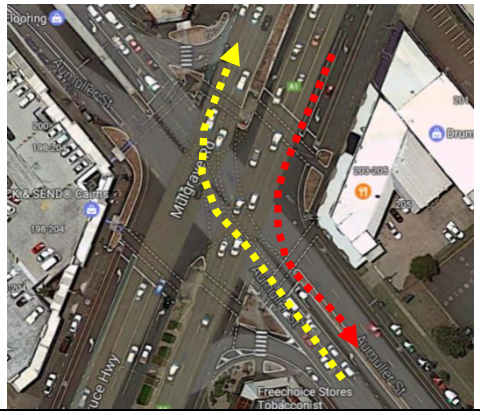
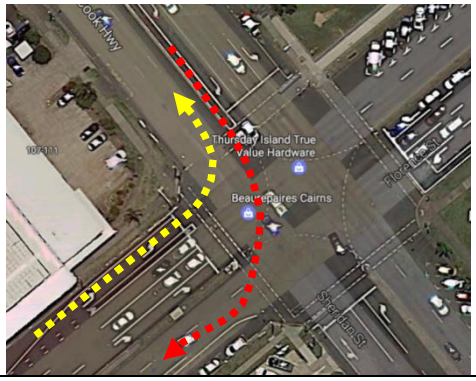
TABLE B14-11 COMPARISON OF PROJECT DAILY MOVEMENTS VS BASELINE

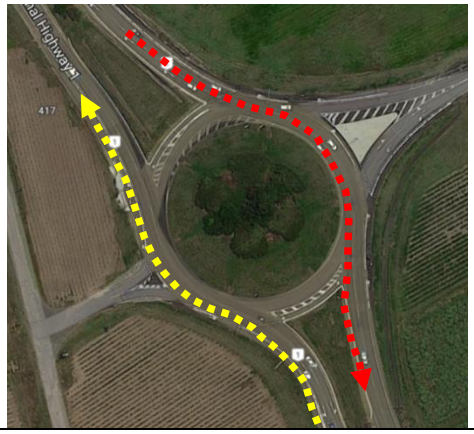
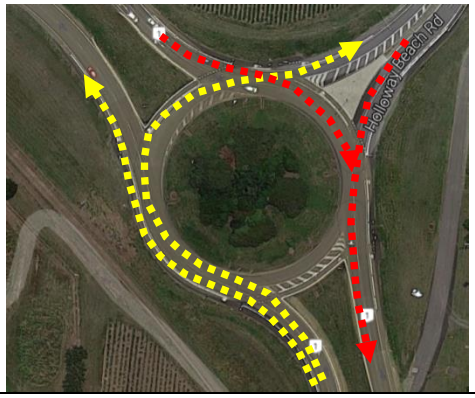
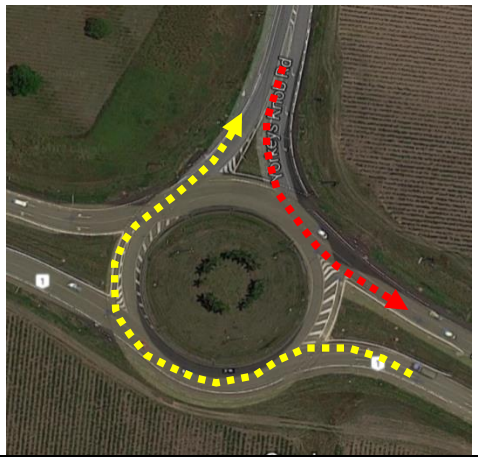
ROAD NETWORK LINK	ESTABLISHMENT MOVEMENTS/BASELI	OPERATION MOVEMENTS/BASEL	DISESTABLISHMENT MOVEMENTS/BASE
Tingira Street	34/3,350 (1.0%)	Nil	34/3,350 (1.0%)
Ray Jones Dr	34/32,000 (0.1%)	`Nil	34/32,000 (0.1%)
Aumuller Street	34/12000 (0.2%)	Nil	34/12000 (0.2%)
Mulgrave Road	34/26,000 (0.12%)	Nil	34/26,000 (0.12%)
Sheridan Street	34/27,000 (0.12%)	22/27000 (0.08%)	34/27,000 (0.12%)
Captain Cook Highway	100/30,000 (0.34%)	22/30,000 (0.07%)	100/30,000 (0.34%)
Holloways Bch Road	40/6,400 (0.6%)	8/6,400 (0.12%)	40/6,400 (0.6%)
Yorkeys Knob Road	60/6,800 (0.8%)	14/6,800 (0.02%)	60/6,800 (0.8%)

Table B14-11 demonstrates that quantum of traffic generation for the establishment, operation and disestablishment of the Barron Delta Pipeline is negligible relative to the existing baseline volumes. The trigger for further analysis as defined by GARID is not achieved. Discussion with TMR and CRC confirmed that both agencies would share a similar view in this regard.

Of greater interest to TMR and CRC will be the transport route as it relates to safe manoeuvring / turning through intersections. The transport of the pipelines will be undertaken outside of the normal commuter peak periods (7am to 9am) and (4pm to 6pm). The transport route will be taken along the TMR dedicated Multi-Combination Routes (refer **Figure B14-5** and **Figure B14-6**.) This may need to be under escort subject to the contractors proposed load configurations and TMR's assessment as to the escort requirements. **Table B14-12** schedules the key intersections that will likely need to be maneuverer by the B-Double transporters of the pipework (yellow paths are 'loaded' and red paths are 'unloaded').

TABLE B14-12 HAUL ROUTE INTERSECTION ASSESSMENT

INTERSECTION	MOVEMENT	COMMENTS
Aumuller / Ray Jones		Intersection currently can accommodate B-Double movements and will be upgraded from June 2018 for same.
Aumuller / Scott Roundabout		Roundabout configured for 2 lane circulation. Rear trailer will track into the inner lane. Confirm with swept path analysis.
Aumuller / Mulgrave		Aumuller approach configured with a right (median side) lane and a combined through / right lane. B-double can turn from the combined lane. Possible tracking into the inner lane. Confirm with swept path analysis.
Mulgrave / Sheridan		Mulgrave approach constrained by turn radius on left turn lane. B-double can sweep wide into median lane. Confirm with swept path analysis.

INTERSECTION	MOVEMENT	COMMENTS
Captain Cook Highway / Machans		Large radius 2 lane roundabout will accommodate B-double movement through the roundabout.
Captain Cook Highway / Holloways Beach		Large radius 2 lane roundabout will accommodate B-double movement through the roundabout and into Holloways Beach Road.
Captain Cook Highway / Yorkeys Knob		Large radius 2 lane roundabout will accommodate B-double turns into Yorkeys Knob Road

Generally the intersections requiring turning movements or manoeuvring are expected to be able to accommodate B-double movements. When the haulage contactor confirms the truck configurations there should be liaison with TMR and Council to establish what limitations may apply as to timing for haulage and escort needs for B-doubles.

B14.6.4.b Access

The access and egress of the B-double trucks from Holloways Beach Road and Yorkeys Knob Road to the laydown sites will be at locations that are not likely to have properly constructed intersections. The movement of the B-doubles as they exit and enter the local roads will be slow in a posted speed environment of 80-100 km/h posted speed. This will create a potential hazard if not adequately managed.

Table B14-13 summarises the risk rating for each of the impacted transport elements arising from the establishment and operation of the Barron delta pipeline.

Most elements of the transport network on the likely haul route will be unaffected by the transport of the pipeline segments. Confirmation of the functional safety and swept path of the actual haulage vehicles should be undertaken at the time when TMR permits are sought. Access to and from Holloways Beach and Yorkeys Knob Road will need to be managed with traffic controllers and temporary pavement widening for safe access to the lay down sites.

TABLE B14-13 PIPELINE ESTABLISHMENT AND OPERATION RISKS

VALUE/ ELEMENT	POTENTIAL IMPACT	CONSEQUENCE RATING	LIKELIHOOD OF IMPACT	RISK RATING BEFORE MITIGATION	SUMMARY OF KEY MITIGATION MEASURE	RESIDUAL RISK
Ray Jones Drive	Reduction of capacity	Negligible	Unlikely	Negligible	Not required	Negligible
Aumuller Street	Reduction of capacity	Negligible	Unlikely	Negligible	Not required	Negligible
Mulgrave Road	Reduction of capacity	Negligible	Unlikely	Negligible	Not required	Negligible
Sheridan Street	Reduction of capacity	Negligible	Unlikely	Negligible	Not required	Negligible
Captain Cook Highway	Reduction of capacity	Negligible	Unlikely	Negligible	Not required	Negligible
Holloways Beach Road	Reduction of capacity	Negligible	Unlikely	Negligible	Not required	Negligible
Yorkeys Knob Road	Reduction of capacity	Negligible	Unlikely	Negligible	Not required	Negligible
Intersection of Aumuller St / Ray Jones Dr	Reduction of safety	Negligible	Unlikely	Negligible	Not required	Negligible
Intersection of Aumuller St / Scott St	Reduction of safety	Minor	Possible	Low	Confirm swept path. Manage by escort.	Negligible
Intersection of Aumuller St / Mulgrave Rd	Reduction of safety	Minor	Possible	Low	Confirm swept path for unloaded path. Manage by escort.	Negligible
Intersection of Mulgrave Rd / Sheridan St	Reduction of safety	Minor	Possible	Low	Confirm swept path for unloaded path. Manage by escort.	Negligible
Intersection of Capt Cook Hwy / Machans Bch Road	Reduction of safety	Negligible	Unlikely	Negligible	Not required	Negligible
Intersection of Capt Cook Hwy / Machans Bch Road	Reduction of safety	Negligible	Unlikely	Negligible	Not required	Negligible
Holloways Bch Road Access	Reduction of safety	Moderate	Likely	Medium	Temporary access works and traffic controllers	Negligible

VALUE/ ELEMENT	POTENTIAL IMPACT	CONSEQUENCE RATING	LIKELIHOOD OF IMPACT	RISK RATING BEFORE MITIGATION	SUMMARY OF KEY MITIGATION MEASURE	RESIDUAL RISK
Yorkeys Knob Road Access	Reduction of safety	Moderate	Likely	Medium	Temporary access works and traffic controllers	Negligible

Overall all of the risks for the establishment, disestablishment and operation of the pipeline can be managed and reconciled back to negligible residual risk. The swept paths for the movement of B-double type trucks will need to be checked for the intersection of Aumuller Street with Scott Street and Mulgrave Road and the intersection of Mulgrave with Sheridan Street. Access to and from Holloways Beach and Yorkeys Knob Roads with the heavy loads will need to be established and operate safely through provision of temporary works to ensure the trucks clear and enter the through lanes safely.

B14.7 Soft Clay DMPA (Barron Delta - Northern Sands)

B14.7.1 Establishment and Operation

The Northern Sands DMPA will receive 900,000m^3 of dredged soft clay materials that will be delivered by pipeline direct to the site. The material will be retained and used as fill to consume space left from historic sand mining industry.

The layout and configuration of the Northern Sands DMPA is shown on **Figure B14-7**.

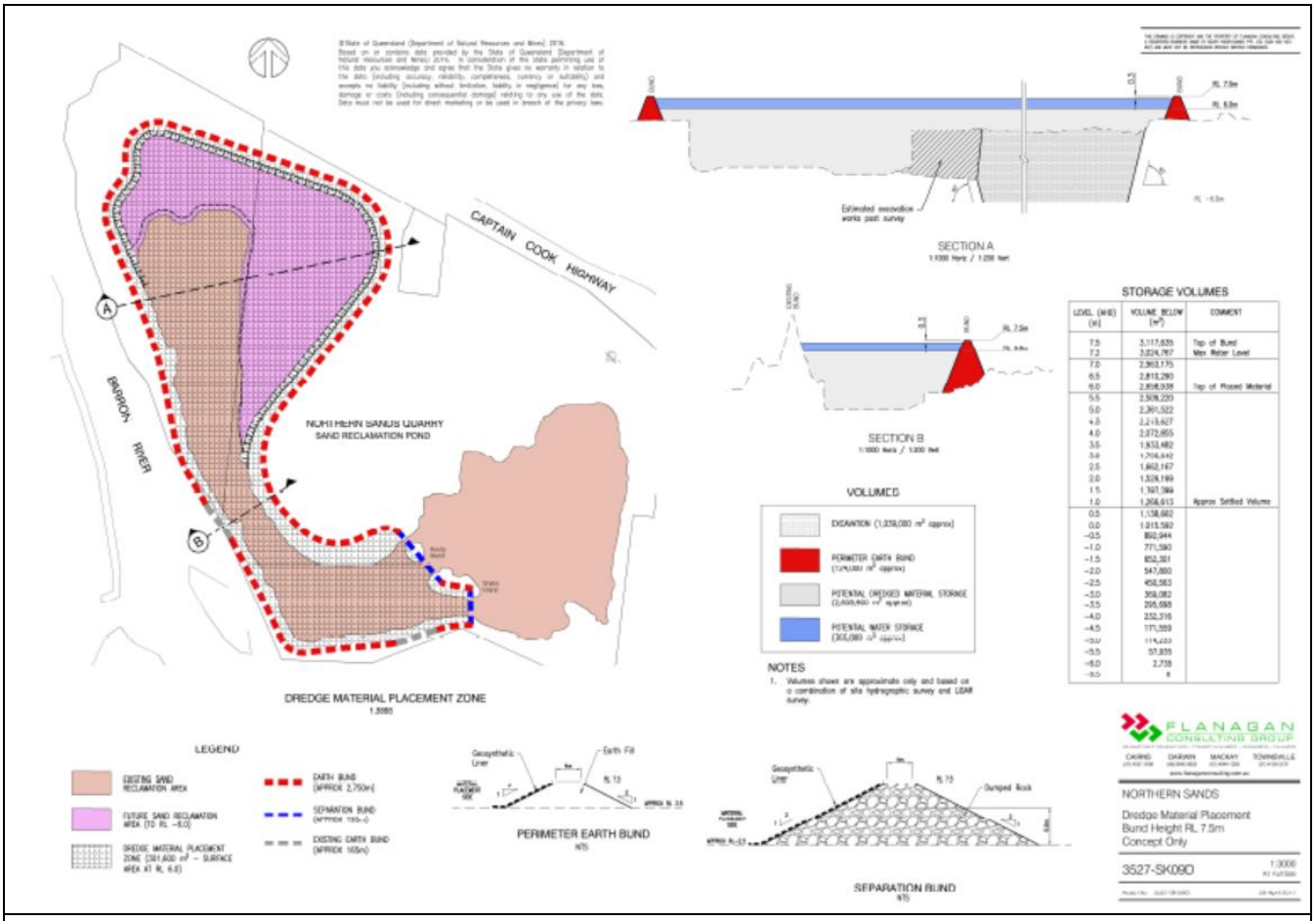


Figure B14-7 Barron Delta (Northern Sands) DMPA Layout.

The establishment of the DMPA requires the construction of a 150 000 m^3 bund at Northern Sands Lake for soft clay placement. A 6 man workforce for the Northern Sands Bund Construction will work 2 x 12 hr shifts/day, 24/7, for a period of 6 weeks.

The operation of the DMPA will involve the delivery of the dredged soft clay materials via pipeline from sea for a duration of 12 weeks.

B14.7.2 Existing Network

Access to and from the DMPA will be via the Captain Cook Highway and will involve the transport of workers from the north and south, and plant, equipment and fuel from the south.

The **Captain Cook Highway** from Airport Avenue to Holloways / Yorkeys Knob Road intersections is 4 lane divided rural arterial road which operates at 80 and 100 km/h posted speeds, interspersed by 40 km limits at roundabout intersections with Machans, Holloways and Yorkeys Knob Roads. The Captain Cook Highway is the primary route servicing the Northern Beaches of Cairns and further north and is configured to cater for the

movement of large vehicles. The link carries nearly 40 000 vpd just north of Airport Avenue and this reduces to about 30000 vpd at Yorkeys Knob Roundabout. The link daily experiences significant delays and queuing in the AM and PM peaks from Airport Avenue north to Machans Beach.

B14.7.3 Potential Transport/Traffic Demands

For the establishment works at Northern Sands, heavy plant comprising Bulldozer, Excavator, Franna Crane, Backhoe and Flatbed Truck and fencing will need to be established to the bund construction yard at Northern Sands Quarry. It is anticipated a fuel truck daily is required to refuel the site plant. Materials available from within the Northern Sands Quarry will be used to construct the bund wall, and hence there will be no haulage required for importation of material.

It is anticipated this will generate a maximum of 12 heavy vehicle trips to the Northern Sands Quarry site in total. (Establishment and Disestablishment).

Table B14-14 below shows the total additional traffic generated at Northern Sands for establishment and disestablishment.

TABLE B14-14 NORTHERN SANDS DMPA ESTABLISHMENT / DISESTABLISHMENT TRAFFIC GENERATION

VEHICLE TYPE	TOTAL TRIPS (FOR 6 WEEKS)	AVERAGE DAILY TRIPS
Light Vehicles	336	8
Heavy Vehicles	48	3 (First Day and Last day) Float 1 (Fuel)

The Northern Sands operational phase will be undertaken by a 6 man workforce working 2 x 12 hr shifts/day, 7 days a week which will generate a maximum of 8 light vehicle trips to and from the site per day assuming a 1.5 person per vehicle occupancy. It is also assumed that the placement activities would generate a maximum of 1 fuel and 1 waste heavy vehicle trip per day to the site over the 12 week period. A further fuel heavy vehicle and 1 maintenance light vehicle trip is proposed to service the land-based pumps and pipeline.

Table B14-15 below shows the total additional traffic generated at Northern Sands for operations.

TABLE B14-15 NORTHERN SANDS DMPA PLACEMENT OPERATION TRAFFIC GENERATION

VEHICLE TYPE	TOTAL TRIPS (FOR 12 WEEKS)	AVERAGE DAILY TRIPS
Light Vehicles	1344	8
Heavy Vehicles	255	3

B14.7.4 Impact Assessment

B14.7.4.a Traffic Assessment

The TMR 2006 *Guidelines for Assessment of Road Impacts of Development* (GARID) identifies that the need for assessment of impact on state road network is triggered where the development traffic generation is in excess of 5% of the baseline.

The establishment of the Northern Sands DMPA may or may not occur concurrently with the establishment of the Barron Delta pipeline. **Table B14-16** summarises the traffic generation associated with the establishment and disestablishment of the Northern Sands DMPA on the Captain Cook Highway, with and without the same activity for the pipeline works.

TABLE B14-16 COMPARISON OF PROJECT ESTABLISHMENT AND DISESTABLISHMENT DAILY MOVEMENTS VS BASELINE

ROAD NETWORK LINK	ESTABLISHMENT MOVEMENTS/BASELINE (% INCREASE)	DISESTABLISHMENT MOVEMENTS/BASELINE (% INCREASE)
Captain Cook Highway (Northern Sands)	22/30,000 (0.06%)	22/30,000 (0.06%)
Captain Cook Highway (Northern Sands + Pipeline)	70/30,000 (0.2%)	70/30,000 (0.2%)

Table B14-16 demonstrates the quantum of traffic generation for the establishment and disestablishment of the Northern Sands DMPA with and without the Barron Delta Pipeline establishment traffic demands is negligible relative to the existing baseline volumes. The trigger for further analysis as defined by GARID is not achieved.

For the operational phase both the Northern Sands and Barron Delta Pipeline with be operating contemporaneously and will have transport demands that coexist on the Captain Cook Highway. **Table B14-17** summarise the traffic generation associated with the operation of the Northern Sands DMPA and the Barron delta Pipeline on the Captain Cook Highway.

TABLE B14-17 COMPARISON OF PROJECT OPERATION DAILY MOVEMENTS VS BASELINE

ROAD NETWORK LINK	OPERATIONS MOVEMENTS/BASELINE (% INCREASE)
Captain Cook Highway (Northern Sands + Pipeline)	30/30,000 (0.1%)

Based on traffic generation the 5% trigger as defined by GARID is not achieved.

B14.7.4.b Access

The Northern Sands Access from the Captain Cook Highway is configured to service the haulage of heavy materials into and out of the site. The access caters for the importing of aggregates and cement materials for the adjacent Boral Concrete plant and for the exporting of sand from Northern Sands. **Figure B14-8** shows the existing configuration of the access.

Figure B14-8 Northern Sands / Boral Quarry Access – Captain Cook Highway.

The existing access is configured with standard deceleration/turn and acceleration lanes at the access. This access will safely cater for the movement of the additional vehicles for the establishment and operation of the Norther Sands DMPA.

Table B14-18 summarises the risk rating for each of the impacted transport elements arising from the establishment and operation of the Barron delta pipeline.

TABLE B14-18 NORTHERN SANDS DMPA ESTABLISHMENT AND OPERATION RISKS

VALUE/ ELEMENT	POTENTIAL IMPACT	CONSEQUENCE RATING	LIKELIHOOD OF IMPACT	RISK RATING BEFORE MITIGATION	SUMMARY OF KEY MITIGATION MEASURE	RESIDUAL RISK
Captain Cook Highway	Reduction of capacity	Negligible	Unlikely	Negligible	Not required	Negligible
Northern Sands Access	Reduction of safety	Negligible	Unlikely	Negligible	Not required	Negligible

Overall all of the risks for the establishment, disestablishment and operation of the Northern Sands DMPA are negligible. Additional traffic demands placed on the Captain Cook Highway, contemporaneous with the pipeline establishment and operations, are negligible. The current access into Northern Sands is of a high standard and will safely accommodate the additional movements and vehicle types.

B14.8 Stiff Clay DMPA (Portsmith – Tingira Street)

B14.8.1 Establishment, Operation and Disestablishment

The Tingira Street Site will receive 100 000 m^3 of dredged stiff clay materials that will be delivered by barge direct to the site. The material will be retained and used on the site as landfill and surcharge to facilitate further commercial development in the area.

Figure B14-9 provides an aerial view of the proposed Tingira Street DMPAs and the road network proximal to the site.

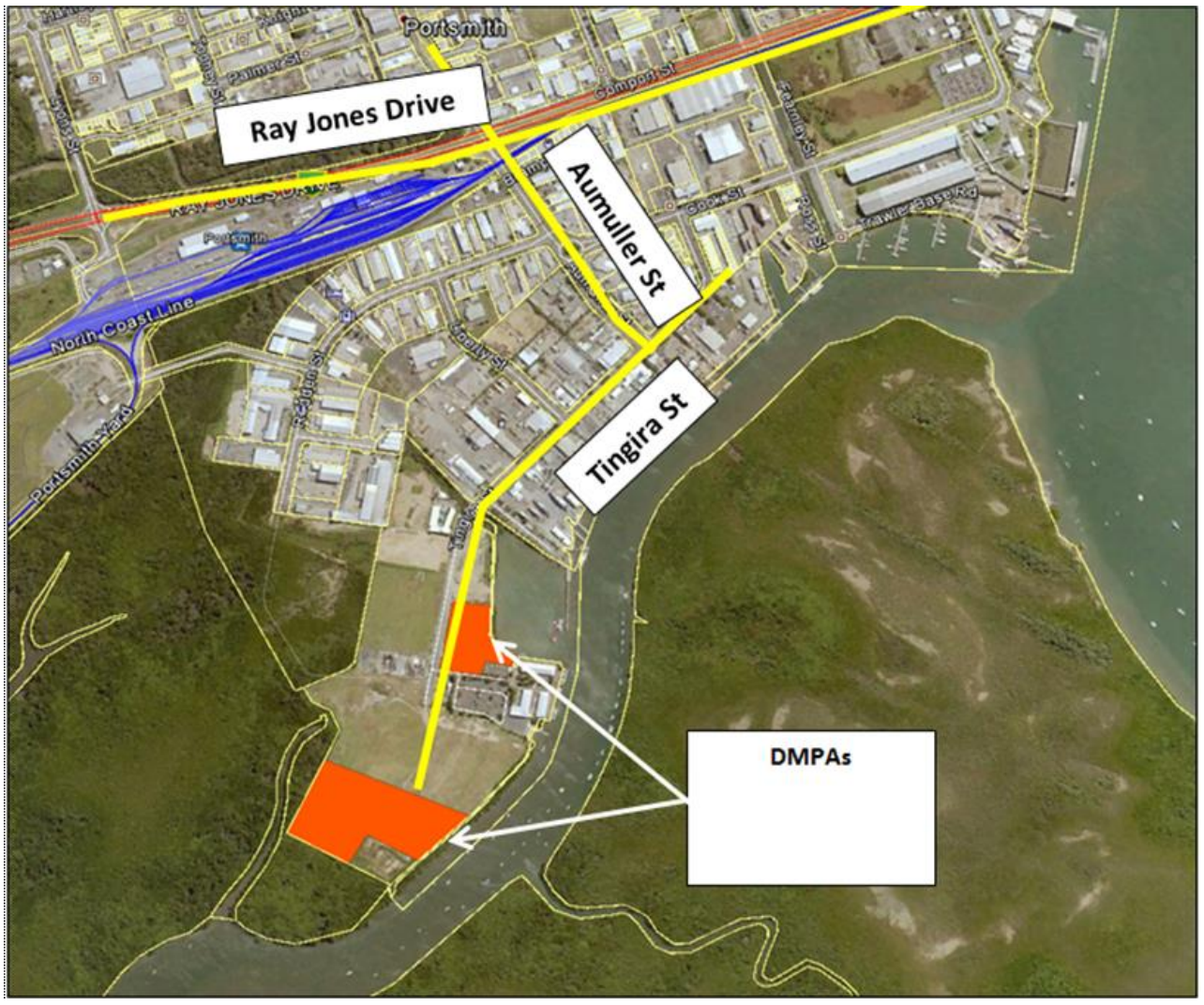


Figure B14-9 Tingira Street DMPAs.

The Tingira Street DMPAs are located on Port land *(Lot 27 on SP2182391)* at the southern end of Tingira Street, Portsmith. The site has two dredge material placement areas located within a parcel of land planned for future commercial and industrial development by Ports North.

The parcel of land is situated adjacent to existing commercial and industrial land uses as part of an industrial precinct that has been reclaimed and developed over the years by Ports North, and prior to that the Cairns Port Authority.

The analysis has been broken up into two sections to reflect the traffic demands at the 3 different stages of the

Cairns inlet stiff clay dredging operation; a 6 week establishment phase, 6 week disestablishment phase and 10 week dredge material placement phase.

B14.8.2 Existing Network

The street network in proximity to the Tingira Street serves to convey commuter traffic associated with industry employment demands in the area, and the movement of goods and materials related to the operation of the industries.

Tingira Street functions to cater for the local movement of commuter light vehicles and over-width heavy vehicles associated with the transfer of large vessels between the Chinaman Creek / Cairns Inlet and the surrounding maritime support services. It is fully constructed and configured to a pavement width of 16m from east of Aumuller Street to the public boat ramp adjacent to Queensland Transport.

Aumuller Street provides connectivity from Tingira Street to Ray Jones Drive (Bruce Highway). Aumuller Street is configured as a 2 lane divided configured configuration with kerb side parallel parking and parking in the centre median. Aumuller Street is the primary route for the conveyance of traffic associated with the commercial, industrial and maritime industries in Portsmith from greater Cairns and destinations to the south.

Ray Jones Drive / Draper Street (Bruce Highway) is the national freight route from the south of Queensland. It is configured as 4 lane divided.

All road links have wide verges suitable for pedestrian movements. There is no trip generation that creates demand for the movement of pedestrians across the local network other than to access on street parking or to gain access to a take-away store. Hence the movement of pedestrians is not considered a high functional priority.

Section B14.6.2 of this report provides a detailed assessment of the current behaviours of these links and the intersections of Tingira / Aumuller and Ray Jones / Aumuller. In summary, the Tingira and Aumuller links are operating at 35% and 50% of capacity respectively and Ray Jones Drive is operating in excess of 90% of capacity in the AM and PM peaks. The intersection of Aumuller Street and Tingira Street operates with substantial latent capacity, and the intersection of Ray Jones and Aumuller is operating with large delays and queuing in the AM and PM peaks.

B14.8.3 Potential Transport/Traffic Demands

The establishment and disestablishment phases have been considered collectively as the operational requirements and associated traffic demands during these phases are the same. There are two traffic generating activities to be undertaken during these phases at the Tingira Street Site, including:-

- Transporting the construction plant and materials to and from the site including 2 x oversize excavators, 3 x moxys, 1 x bulldozer, 1 x grader and 1 x water truck, crib facilities, ablutions and temporary fencing.
- Construction/preparation of the placement site with a 4 man workforce working a 12 hour day shift/7 days a week.

The transporting of the plant and materials to the site will require a maximum of 18 oversize heavy vehicle trips and 2 heavy vehicle trips to the site (9 oversize and 1 standard during each phase) in total. The construction/preparation and decommissioning of the site will generate a maximum of 3 light vehicle trips per day to the site over the 6 week period assuming a 1.5 person per vehicle occupancy. It is also assumed that the construction activities would generate a maximum of 1 fuel and 1 waste heavy vehicle trip per day to the site over the 6 week period. **Table B14-19** below shows the total traffic generated during this period.

The site preparation/ activity will operate within normal construction hours between 6:30 am and 6:30 pm and the associated staff trip generation will be outside of the commuter peak traffic periods. Refuelling and waste placement will be a routine operation generally organised outside of the peak periods. All parking requirements are will be provided within the site having no impact on the Tingira Street facilities.

TABLE B14-19 TINGIRA STREET ESTABLISHMENT/DISESTABLISHMENT TRAFFIC GENERATION

VEHICLE TYPE	TOTAL TRIPS (FOR 12 WEEKS)	AVERAGE DAILY TRIPS
Light Vehicles	224	2 – 3
Heavy Vehicles	188	2 – 3

The floating of plant will use a combination of Local Industrial, Sub-arterial Roads and National Highway to access the site with oversized road legal vehicles. The movements will happen outside of peak traffic periods with appropriate controls and permits from Cairns Regional Council and the Department of Transport and Main Roads.

The 10 week stiff clay placement phase at the Tingira Street Site consists of unloading the stiff clay from barges at the site and earthworks operations within the site to shape and compact material in place. The operational phase will be undertaken by an 8 man workforce working 2 x 12 hr shifts/day, 7 days a week which will generate a maximum of 10 to 11 light vehicle trips to the site per day assuming a 1.5 person per vehicle occupancy. It is also expected that the placement activities would generate a maximum of 1 fuel and 1 waste heavy vehicle trip per day to the site over the 10 week period. **Table B14-20** below shows the total traffic generated during this period.

TABLE B14-20 TINGIRA STREET PLACEMENT OPERATION TRAFFIC GENERATION

VEHICLE TYPE	TOTAL TRIPS (FOR 10 WEEKS)	AVERAGE DAILY TRIPS
Light Vehicles	747	11
Heavy Vehicles	140	2

The material placement activity is expected to have shift changeover at 6 – 7:00 am and 6 – 7:00 pm and the associated staff trip generation will be outside of the peak traffic periods. Refuelling and waste placement will be a routine operation organised outside of the peak periods and the total average 12 to 13 trips generated by the operation. All parking requirements will be provided within the site having no impact on the Tingira Street facilities.

B14.8.4 Impact Assessment and Mitigation

B14.8.4.a Traffic Assessment

The TMR 2006 *Guidelines for Assessment of Road Impacts of Development* (GARID) identifies that the need for assessment of impact on state road network is triggered where the development traffic generation is in excess of 5% of the baseline. **Table B14-21** summarise the traffic generation associated with the establishment, operation and disestablishment of the Barron delta pipeline on the transport network.

TABLE B14-21 COMPARISON OF PROJECT DAILY MOVEMENTS VS BASELINE

Road Network Link	Establishment Movements/Baseline (% increase)	Operation Movements/Baseline (% increase)	Disestablishment Movements/Baseline (% increase)
Tingira Street or	12/3,350 (0.4%)	26/3,350 (0.6%)	12/3,350 (0.4%)
Ray Jones Dr	12/32,000 (0.04%)	26/32,000 (0.08%)	12/32,000 (0.04%)
Aumuller Street	12/12000 (0.1%)	26/12000 (0.2%)	12/12000 (0.1%)

Table B14-21 demonstrates that quantum of traffic generation for the establishment, operation and disestablishment of the Tingira Street DMPA is negligible relative to the existing baseline volumes. The trigger for further analysis as defined by GARID is not achieved. Discussion with TMR and CRC confirmed that both agencies would share a similar view in this regard.

B14.8.4.b Access

Access to both sites will DMPAs will be via Tingira Street. The accesses will need to cater for only the transport of plant and daily movements of staff and service vehicles. The supply of the dredge material will enter the DMPAs via Trinity Inlet.

Figure B14-10 shows the site and street view of the frontage to the Northern DMPA site from Tingira Street.

Figure B14-10 Layout and Street View of Northern DMPA.

Access to the site can be safely established with a temporary cross over.

Figure B14-11 shows the layout to the southern DMPA site at the end of Tingira Street.

Figure B14-11 Layout and Street View of Southern DMPA.

Access to the site can be safely established from the end of the constructed Tingira Street to the DMPA site.

Table B14-22 summarises the risk rating for each of the impacted transport elements arising from the establishment and operation of the Tingira Street DMPAs.

TABLE B14-22 TINGIRA STREET DMPAS ESTABLISHMENT AND OPERATION RISKS

VALUE/ ELEMENT	POTENTIAL IMPACT	CONSEQUENCE RATING	LIKELIHOOD OF IMPACT	RISK RATING BEFORE MITIGATION	SUMMARY OF KEY MITIGATION MEASURE	RESIDUAL RISK
Ray Jones Drive	Reduction of capacity	Negligible	Unlikely	Negligible	Not required	Negligible
Aumuller Street	Reduction of capacity	Negligible	Unlikely	Negligible	Not required	Negligible
Tingira Street	Reduction of capacity	Negligible	Unlikely	Negligible	Not required	Negligible
Intersection of Ray Jones and Aumuller	Reduction of safety	Negligible	Unlikely	Negligible	Not required	Negligible
Intersection of Tingira and Aumuller	Reduction of safety	Negligible	Unlikely	Negligible	Not required	Negligible
Access to Northern DMPA	Reduction of safety	Negligible	Unlikely	Negligible	Not required	Negligible
Access to Southern DMPA	Reduction of safety	Negligible	Unlikely	Negligible	Not required	Negligible

Overall all of the risks for the establishment, disestablishment and operation of the Tingira Street DMPAs are negligible.

B14.9 Impact Category Summary

While the greater majority of transport risks associated with the CSDP have a negligible risk significance, 3 elements of the project have low or moderate risks prior to mitigations being implemented.

Table B14-23 identifies these pre-mitigation risks and their associated impact categories. It is noted that all traffic and transported risks have negligible risk significance once mitigations have been implemented

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TABLE B14-23 IMPACT CATEGORY SUMMARY

ELEMENT	ADVERSE IMPACT	BENEFICIAL IMPACT	CONSEQUENTIAL IMPACT	CUMULATIVE IMPACT	SHORT TERM	LONG TERM	REVERSIBLE	IRREVERSIBLE	PREDICTABLE	UNPREDICTABLE
CCLT Bus and Taxi Facilities	Limited onsite storage during peak passenger periods		Increased opportunity for Bus/Taxi/Pedestrian interfaces		X		X		X	
CCLT Pedestrian Facilities	Interfaces with Buses and Taxis at Pick-up facility/Shared Pedestrian Area requiring Traffic Controllers				X		X		X	
Pipeline Establishment	Reduced Safety on Aumuller/Scott St Intersection during HV turning movements				X		X		X	

B14.10 Conclusions

The following conclusions are made with respect to the assessment of Transport Impacts associated with the development of the Cairns Shipping Development Project:

- Construction works associated with the wharf redevelopment for the Cairns Cruise Liner Terminal will have negligible impacts on the external transport network.
- The operations of the Cairns Cruise Liner Terminal will have negligible impacts on the external transport network. Some refinement of internal facilities and management associated with pedestrian and bus/taxi provisions are recommended to improve safety and functionality at the terminal.
- The sea based dredging operations will be established from sea and involves the transfer of crews on a 2 weekly shift change by coach. There will be negligible impacts on the external transport network by the sea based dredging operations.
- The establishment and assembly of the pipeline transferring dredged soft clays to the Barron Delta (Northern Sands) will have negligible impact on capacity of the network. The pipeline haulage contractor will need to confirm the haulage vehicle configurations, routes, timing and manoeuvrability through intersections through the TMR permitting process. In addition consideration will need to be given to the construction of temporary access works on Holloways Beach Road and Yorkeys Knob Road and the provision of traffic controllers to facilitate safe access and egress of the heavy vehicles.
- The operation of the pipeline transferring dredged soft clays to the Barron Delta (Northern Sands) is serviced by 18 to 20 staff per day and a daily fuel truck and service vehicle. The impact on the operation of the road network is negligible.
- The establishment and operation of the Northers Sands DMPA requires approximately 6 staff per day for a total period of 24 weeks. The impact on the operation of the road network is negligible.
- The establishment and operation of the Tingira Street DMPA sites requires the movement of up to 3 light vehicles and 3 heavy vehicles per day over the 22 week establishment, operations and disestablishment phases. The impact on the operation of the road network is negligible

B14.11 References

Austroads, 2009. Guide to Traffic Management Part 12 Traffic Impacts of Development.

Department of Transport and Main Roads (DTMR), 2006. Guidelines for Assessment of Road Impacts of Development.

Ports North. 2014. Cairns Shipping Development Project Draft Environmental Impact Statement. November 2014.