Transport

25

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25.1 Introduction

The region generally is highly accessible, with airports in Mackay and Proserpine and supporting infrastructure already well developed in order to support the established tourism industry in the region. The Whitsunday Airport located just south of Proserpine is the main route for tourism and business domestic air travel to the Whitsunday region providing access to Proserpine, Airlie Beach, and the Whitsunday Islands. It is serviced by Jetstar and Virgin to and from Brisbane. Hamilton Island Airport has direct flights from a wider range of cities including Sydney, Melbourne and Cairns. At this point in time, it is the only commercial airport on the Whitsunday Islands and also services private flights and scenic charters. The airport on Hamilton Island, which is approximately 15 kilometres from Lindeman Island, is easily accessible by boat. Lindeman, Hamilton, and Airlie Beach were regularly connected via a scheduled water-based route until Club Med Lindeman Island's closure in 2012. Mackay Transit Coaches provide bus services throughout Mackay, covering the city, northern beaches, the university and hospital, Mirani, Walkerston and Sarina. Whitsunday Transit run buses from Proserpine (including the Airport), through to Cannonvale, Airlie Beach and Shute Harbour. Additionally the region is serviced by Mackay Whitsunday Taxis, touted as one of the largest taxi service areas in Queensland, covering the region from Sarina (south of Mackay), north to Airlie Beach. This section of the EIS considers the transport task and associated road, sea and air aspects of the project. In particular it assesses impacts on the state-controlled road network associated with the proposed resort particularly during the construction phase of the project, using the most recent information available at the time.

Addendum: *This EIS was initially prepared assuming that the safe harbour was to be part of the Lindeman Great Barrier Reef Resort Project. With the commencement of the Great Barrier Reef Marine Park Authority's (GBRMPA) Dredging Coral Reef Habitat Policy (2016), further impacts on Great Barrier Reef coral reef habitats from yet more bleaching, and the recent impacts from Tropical Cyclone Debbie, the proponent no longer seeks assessment and approval to construct a safe harbour at Lindeman Island. Instead the proponent seeks assessment and approval for upgrades to the existing jetty and additional moorings in sheltered locations around the island to enable the resort's marine craft to obtain safe shelter under a range of wind and wave conditions. Accordingly, remaining references to, and images of, a safe harbour on various figures and maps in the EIS are no longer current.*

25.2 Assessment Approach

The Guidelines for Assessment of Road Impacts of Developments (GARID), published by the Department of Transport and Main Roads (TMR), sets out the framework for traffic assessments, including road impact assessments and pavement impact assessments. The general structure for preparing RIAs is as follows:

- Development profile;
- Future traffic volumes;
- Scope of assessment and criteria adopted;
- Impact assessment and determination of impact mitigation measures; and
- Determination of development conditions or developer contribution required.

The following sections and **Appendix W (section 2)** provides further information on this assessment.

25.3 Transport Task

The traffic generating activities associated with the project can be classified under two stages, the construction stage and the operations stage. The construction stage will generate the majority of trips, with the bulk of deliveries being made by road. Additionally, the trips have been categorised as either workforce trips or delivery trips. The following sections describe the workforce and delivery arrangements, as advised by the project team.

25.3.1 Workforce

In terms of workforce, staff will be locally sourced with some fly-in fly-out for the construction stage. During the operations, it is anticipated that all staff will be from the local area. Staff will be accommodated on the island and therefore, there will not be two trips associated with each employee. It is assumed that the roster will be staggered, with weekly changeovers for fly-in fly-out employees and daily changeovers for local staff. Therefore, there will be both in and out trips, however only a portion of the staff will be travelling each day. Staff will be driven to Shute Harbour to board the ferry to Lindeman Island. Mode of travel to and from Shute Harbour will range from car, as either driver or passenger, or by charter bus. It is noted that those driving themselves to Shute Harbour will require parking.

25.3.2 Deliveries

The schedule for deliveries is not finalised, however due care has been taken to prepare the most reasonable assessment for the RIA. The number of vehicle trips has been based on the assumption that deliveries will be constantly arriving each day throughout the construction period. A variety of heavy vehicles has been assumed to be used, including the following:

- 6 tonne capacity Aggi trucks
- 24 tonne capacity semi trailer
- 30 tonne capacity truck and dog

The multi-combination routes defined by TMR indicate that 25m B-doubles are only permitted on Proserpine-Shute Harbour Road between the Bruce Highway and William Murray Drive. As the project deliveries will require access beyond William Murray Drive, the maximum commercial vehicle size has been capped at a 30 tonne truck and dog which is the maximum allowable vehicle without requiring special permission for multi-combination use. It is noted that while Aggi trucks have been included in the assessment, the time taken to be transported from the concrete manufacturing plant to Shute Harbour and then on a barge to Lindeman Island would be too long for the concrete to remain manageable. Hence, the project will include an on-site concrete batching plant on the island. As such, the deliveries of concrete are assumed to constitute the dry materials arriving by semi trailer.

25.3.3 Traffic Demands

This section outlines the calculations for estimating the trips associated with the project activities. It has been categorised into the following subsections:

- Construction workforce trips;
- Construction delivery trips;
- Operations workforce trips; and
- Operations delivery trips.

25.3.3.1 Construction Workforce

Table 25-1 outlines the assumptions and calculations for the estimation of traffic associated with the construction workforce trips, that is, those trips for workers arriving and leaving the island during the construction of the resort redevelopment. It is estimated that construction will take approximately three years with construction material to be sourced from the Island's quarry where possible.

Table 25-1. Construction Workforce Assumptions.

Component	Assumption
Peak workforce (total workers employed at peak construction period, note this is not assumed to be total workers on site an any given time)	300 workers employed
From local areas (e.g. Airlie Beach, Proserpine, Cannonvale)	70% = 210 workers
From regional areas (fly in, fly out)	30% = 90 workers
Local workers:	
Roster	5 days on, 2 days off
Proportion staying on island / commuting everyday	80% / 20%
Frequency of rosters for workers staying on island	Daily changeover
Workers staying on island changing over per day	210 * 80% / 7 days of changeover = 24 workers
Workers commuting everyday	210 * 20% = 42 workers
Total workers changing over each day	66 workers
Proportion of local workers residing in the local area (Airlie Beach, Proserpine, Cannonvale)	50%
Proportion of local workers residing in the wider area (Mackay, Townsville)	50%
Proportion of workers from wider area originating south / north of Airlie Beach	70% / 30%
Proportion of local workers driving themselves to Shute Harbour / being dropped off	30% / 70%
Workers (local area) driving themselves / being dropped off	10 / 23
Proportion of local workers from wider area driving themselves to Shute Harbour / taking charter bus	10% / 90%
Workers (wider area) driving themselves / taking charter bus	3 / 30
Occupancy for bus	12 people
Number of charter buses per day	30 workers / 12 people per bus = 3 buses
FIFO workers:	
Roster	3 weeks on / 1 week off
Frequency of rosters for workers	Weekly changeover
Proportion of workers flying into Proserpine / Hamilton Island	100% / 0%
Workers per weekly changeover	90 / 4 changeovers = 23 workers changing over each week
Proportion of workers taking bus	100%
Occupancy for bus	12 people
Number of buses per changeover	23 workers / 12 people per bus = 2 buses
All workers:	

Component	Assumption
Arriving by car	36 workers
Arriving by bus	30 workers
Number of car trips	36 trips in / 23 trips out
Number of bus trips	5 buses in / 5 buses out

As shown, in terms of daily one way trips (i.e. workers arriving or workers leaving) a total of 59 light vehicle trips and 10 bus trips have been estimated. The existing traffic volumes were based on historical count data received from TMR. **Table 25-2** summarises the baseline traffic volumes.

Table 25-2. Baseline Traffic Estimation.

Count Site	Location	2014 AADT	Average Annual Growth Rate	2018 AADT
82888	Mt Julian	6,351 vpd	2%	6,807 vpd
83048	Mt Marlow	6,357 vpd	2%	6,921 vpd
80021	Sugarloaf	9,184 vpd	1%	9,483 vpd
83222	Cannon Valley	10,976 vpd	2%	11,748 vpd
83114	Cannonvale	17,925 vpd	2%	19,490 vpd
80178	West Airlie Beach	14,141 vpd	0%	14,141 vpd
83229	Waterson Way	6,462 vpd	1%^	6,462 vpd
80177	East Airlie Beach	8,791 vpd	1%	9,084 vpd
80181	Jubilee Pocket	5,337 vpd	0%	5,337 vpd
82848	Flametree	1,715 vpd	0%	1,715 vpd

Note ^ No historical data to estimate traffic growth at this site, therefore growth rate taken as average of other sites

Daily trips has been assumed to be double the trips calculated for the directional changeover, representing both arriving workers and departing workers. **Table 25-3** presents the proportionate impact of the daily workforce trips to the 2018 baseline traffic.

Table 25-3. Construction Workforce Traffic Impact.

Count Site	Location	2018 AADT	Daily Trips	Proportionate Impact
82888	Mt Julian	6,807 vpd	50 vpd	1%
83048	Mt Marlow	6,921 vpd	50 vpd	1%
80021	Sugarloaf	9,483 vpd	56 vpd	1%
83222	Cannon Valley	11,748 vpd	56 vpd	0%
83114	Cannonvale	19,490 vpd	112 vpd	1%
80178	West Airlie Beach	14,141 vpd	121 vpd	1%
83229	Waterson Way	6,738 vpd	121 vpd	2%
80177	East Airlie Beach	9,084 vpd	121 vpd	1%
80181	Jubilee Pocket	5,337 vpd	139 vpd	3%
82848	Flametree	1,715 vpd	139 vpd	8%

As shown, a significant impact (in terms of a 5% trigger as defined by TMR in GARID), is shown to be estimated for the eastern section of Proserpine-Shute Harbour Road, represented by count site 82848. This scoping assessment provides an indication of the area of investigation for the pavement impact assessment.

25.3.3.2 Construction Deliveries

A review of the construction program and materials required has been undertaken by the proponent to estimate the quantity of heavy vehicles required to deliver supplies to the harbour for shipping to the island. As a result of this, the total quantities for the defined materials were reduced as per **Table 25-4**.

Table 25-4. Construction Materials Assumptions.

Component	Total
Concrete	180,991 m^3
Steel	20,019 tonnes
Gravel and fill	18,379 m^3
Waste	21,939 m^3

With these yields, the estimated traffic demands were calculated as outlined in **Table 25-5.** It is noted that the rate of construction was assumed to occur constantly over the allotted construction periods. Additionally, all deliveries have been assumed to arrive by truck at Shute Harbour with a barge taking the goods to the island. It is acknowledged that the likely logistic constraint for the deliveries will be the barge deliveries. For example, if there are only two barges scheduled per day, with a capacity to carry 10 trucks of freight, then the daily delivery limit would need to be capped at 20 trucks per day. Currently no information has been provided with regards to the schedule for barge deliveries or the capacity for the barge, however understanding the proposed arrangement will provide assistance in estimating the accurate level of traffic demands.

Table 25-5. Construction Delivery Assumptions.

Component	Assumption
Peak construction period (estimated as maximum monthly materials from total materials averaged over construction duration for each stage of works)	Nov / Dec 2018
Assumed all deliveries arrive by truck to Shute Harbour then depart via same route	
Assumed all deliveries offload onto a barge at Shute Harbour	
Concrete (quantity per month)	6,841 m^3
Steel (quantity per month)	794 tonnes
Gravel and fill (quantity per month)	698 m^3
Construction materials (cabling, ducting, pipe etc.) (quantity per month) (ratio assumed from previous EIS calculations)	Assumed 20% of concrete quantity = 6,841 m^3 * 20% = 1,368 tonnes
Average number of days per month	30 days
Approximate conversion for m^3 to tonnes (aggregate, gravel)	2.1 tonnes = 1 m^3
Concrete (quantity per day)	228 m^3 = 479 tonnes
Steel (quantity per day)	26 tonnes
Gravel and fill (quantity per day)	23 m^3 = 49 tonnes
Construction materials (quantity per day)	46 tonnes
Waste (quantity per day) assumed as 10% of total materials, as per assumptions	60 tonnes
Total materials and waste	660 tonnes
Other supplies:	
Food per person per day	1.5 kg
Workers on site at any one time	300 workers * 5 days on / 7 days = 215 workers
Food required per day	215 workers * 1.5 kg = 323 kg

Component	Assumption
Frequency of food deliveries	Weekly
Quantity of food required per shipment	323 kg * 7 days = 2,258 kg
Fuel requirement per year (metric assumed from previous EIS calculations)	18,500 kL
Average fuel required per day	18,500 kL / 365 days = 50.7 kL
Conversion from kL to tonnes	50.7 kL * 832 kg/m^3 / 1000kg = 42 tonnes per day
Truck capacities:	
Aggi truck	6 tonnes
Semi trailer	22 tonnes
Truck and dog	30 tonnes
Number of trucks per day:	
Concrete using Semi trailer	22 trucks
Steel using Semi trailer	2 trucks
Gravel and fill using Truck and dog	2 trucks
Construction materials using Semi trailer	3 trucks
Waste using Semi trailer	3 trucks
Food using Semi trailer	1 truck
Fuel using Semi trailer	2 trucks
Total daily trucks (one way)	**35 trucks per day**
Assumed hours of operation for trucks on the road network	12 hours per day
Average number of trucks per hour	**3 trucks per hour**

As shown, during the peak construction period, the daily traffic demand has initially been estimated at 35 trucks per day. This refers to one way traffic, representing 70 truck trips in total per day. **Table 25-6** summarises the proportionate impact in terms of heavy vehicle trips on the baseline volumes. The 2018 volumes have been estimated using the annual growth rates reported in **Table 25-2**, which have been applied to the 2014 heavy vehicle traffic. As shown, assuming that all deliveries travel along the entire length of Proserpine-Shute Harbour Road, the proposed construction traffic will have a significant impact along all segments of the road (i.e. greater than 5% on baseline traffic).

Table 25-6. Construction Deliveries Traffic Impact – Heavy Vehicle Trips

Count Site	Location	2018 Baseline HV	Daily Trips	Proportionate Impact
82888	Mt Julian	480 vpd	70 vpd	15%
83048	Mt Marlow	610 vpd	70 vpd	11%
80021	Sugarloaf	604 vpd	70 vpd	12%
83222	Cannon Valley	747 vpd	70 vpd	9%
83114	Cannonvale	967 vpd	70 vpd	7%
80178	West Airlie Beach	620 vpd	70 vpd	11%
83229	Waterson Way	438 vpd	70 vpd	16%
80177	East Airlie Beach	438 vpd	70 vpd	16%

Count Site	Location	2018 Baseline HV	Daily Trips	Proportionate Impact
80181	Jubilee Pocket	306 vpd	70 vpd	23%
82848	Flametree	186 vpd	70 vpd	38%

Given the relatively high impact estimated for Proserpine-Shute Harbour Road, the impact on the Bruce Highway was investigated to understand whether the scope of the pavement impact assessment will need to be widened. **Table 25-7** reports the estimated impact of the heavy vehicles. It has been assumed that 50% of deliveries originate from the north and 50% from the south. A nominal 2% growth rate has been applied to the 2014 volumes.

Table 25-7. Construction Deliveries Traffic Impact – Heavy Vehicle Trips - Bruce Highway.

Count Site	Location	2014 Baseline HV	2018 Baseline HV	Daily Trips	Proportionate Impact
82717	Bruce Highway north of Gregory-Cannon Valley Road	702 vpd	759 vpd	35 vpd	4.6%
80010	Bruce Highway south of Proserpine-Shute Harbour Road	764 vpd	825 vpd	35 vpd	4.2%

As shown, the impact on the Bruce Highway is estimated to be marginally less than 5%. However, it is noted that this is a preliminary assessment and that the detailed assessment will likely yield a greater impact as with consideration of the directional loading and equivalent standard axles (ESAs), the impact will be intensified.

With this in mind, it is acknowledged that the Bruce Highway is part of the National Land Transport Network which receives funding from the Federal government. This indicates that there is an expectation for these roads to serve as strategic links and thus will carry greater traffic volumes and cope with greater increases in AADT and ESAs. Therefore, responsibility for any potential upgrades to the Bruce Highway should not fall solely on the developer should the pavement impact assessment indicate that the impact of the development will be significant and require works or a contribution.

25.3.3.3 Operations Workforce

Table 25-8 outlines the assumptions and calculations for the estimation of traffic associated with the operational workforce trips, that is, those trips for workers arriving and leaving the island for work.

Table 25-8. Operations Workforce Assumptions.

Component	Assumption
Peak workforce	300 workers
From local areas (e.g. Airlie Beach, Proserpine, Cannonvale)	100% = 300 workers
From regional areas (fly in, fly out) Note: assumptions register mentions possibly 5% regional workers however this has been disregarded by subsequent items in the assumptions register	0% = 0 workers
Local workers:	
Roster	5 days on, 2 days off
Proportion staying on island / commuting everyday	100% / 0%
Frequency of rosters for workers staying on island	Daily changeover
Workers staying on island changing over per day	300 / 7 days of changeover = 43 workers
Workers commuting everyday	0 workers
Total workers changing over each day	43 workers
Proportion of local workers residing in the local area (Airlie Beach, Proserpine, Cannonvale)	50%
Proportion of local workers residing in the wider area (Mackay, Townsville)	50%
Proportion of workers from wider area originating south / north of Airlie Beach	70% / 30%
Proportion of local workers driving themselves to Shute Harbour / being dropped off	30% / 70%
Workers (local area) driving themselves / being dropped off	6 / 15
Proportion of local workers from wider area driving themselves to Shute Harbour / taking charter bus	10% / 90%
Workers (wider area) driving themselves / taking charter bus	2 / 19
Occupancy for bus	12 people
Number of charter buses per day	To/from south: 14 workers / 12 people per bus = 2 buses To/from north: 6 workers / 12 people per bus = 1 bus Total = 3 buses per direction
All workers:	
Arriving by car	24 workers
Arriving by bus	19 workers
Number of car trips	24 trips in / 15 trips out
Number of bus trips	3 buses in / 3 buses out

As shown, in terms of daily one way trips (i.e. workers arriving or workers leaving) a total of 39 light vehicle trips and 6 bus trips have been estimated.

For the purpose of undertaking the traffic assessment, operations are assumed to begin in 2020. The baseline traffic at 2020 has been estimated based on the growth rates outlined in **Table 25-2**. **Table 25-9** summarises the proportionate impact estimated.

Table 25-9. Operations Workforce Traffic Impact.

Count Site	Location	2020 Baseline AADT	Daily Trips	Proportionate Impact
82888	Mt Julian	7,035	20 vpd	0%
83048	Mt Marlow	7,203	20 vpd	0%
80021	Sugarloaf	9,633	25 vpd	0%
83222	Cannon Valley	12,134	25 vpd	0%
83114	Cannonvale	20,272	66 vpd	0%
80178	West Airlie Beach	14,141	77 vpd	1%
83229	Waterson Way	6,876	77 vpd	1%
80177	East Airlie Beach	9,230	77 vpd	1%
80181	Jubilee Pocket	5,337	89 vpd	2%
82848	Flametree	1,715	89 vpd	5%

As shown, a significant impact (in terms of a 5% trigger as defined by TMR in GARID), is shown to be estimated for the eastern section of Proserpine-Shute Harbour Road, represented by count site 82848.

25.3.3.4 Operations Deliveries

With regards to the deliveries during the operations of the development, the assumptions provided only refer to barge deliveries. Without further advice such as the barge capacity and delivery schedule, the number of delivery trips will be difficult to estimate. **Table 25-10** summarises the information provided.

Table 25-10. Operations Delivery Assumptions.

Component	Assumption
Water	1 barge per week
Food	1 barge per week
Waste	1 barge per week
Fuel	1 barge per week, perhaps monthly depending on usage

25.4 Road Transport

25.4.1 Study Area

The study area largely falls within the Mackay Whitsunday District of the Department of Transport and Main Roads. **Figure 25-1** illustrates the state controlled road network associated with the project.

Figure 25-1. State Controlled Road Network.

Source: Google maps, www.maps.google.com.au

Table 25-11 summarises the key characteristics of the key roads. The average AADT values from the 2014 traffic census have been included to provide a general indication of the demand on each road.

Table 25-11. State Controlled Roads.

Road ID	State Controlled Road	Section	Average 2014 AADT
10J	Bruce Highway (Proserpine to Bowen)	Proserpine to Bowen	5,700 vpd
10H	Bruce Highway (Mackay to Proserpine)	Mackay (north of Bucasia turnoff) to Proserpine	6,150 vpd
851	Proserpine-Shute Harbour Road	Proserpine to Shute Harbour	8,700 vpd
8501	Gregory-Cannon Valley Road	Bruce Highway to Proserpine-Shute Harbour Road	2,400 vpd

Source: Queensland Government, 2014Traffic Census Data

25.4.2 Baseline Traffic Volumes

With regards to the baseline traffic, TMR data for Proserpine-Shute Harbour Road has been sourced. The most recent data provided was from 2014, for all count sites along the road between the Bruce Highway at Proserpine and Shute Harbour. The average annual growth rate from 2007 to 2014 was adopted for each site, to estimate the baseline traffic at the peak construction period (2018). **Table 25-12** summarises the baseline traffic volumes, using the most recent data available at the time. No significant traffic growth is expected on Waterson Way due to minimal increases at this location in the road network.

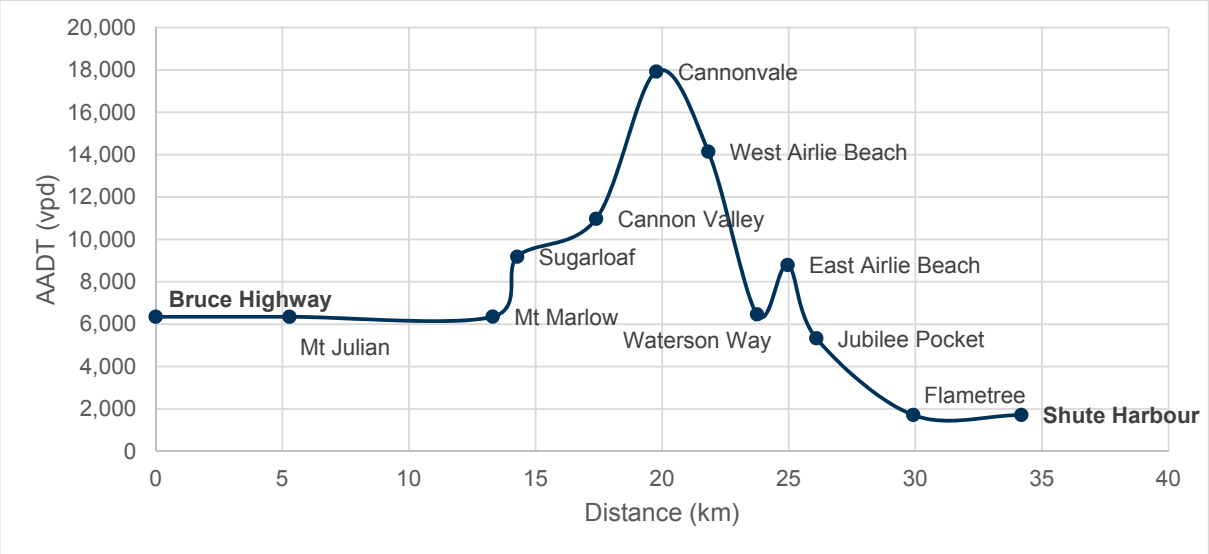
Table 25-12. Baseline Traffic Estimation.

Count Site	Location	2014 AADT	Average Annual Growth Rate	2018 AADT
82888	Mt Julian	6,351 vpd	2%	6,807 vpd
83048	Mt Marlow	6,357 vpd	2%	6,921 vpd
80021	Sugarloaf	9,184 vpd	1%	9,483 vpd
83222	Cannon Valley	10,976 vpd	2%	11,748 vpd
83114	Cannonvale	17,925 vpd	2%	19,490 vpd
80178	West Airlie Beach	14,141 vpd	0%	14,141 vpd
83229	Waterson Way	6,462 vpd	-^	6,462 vpd
80177	East Airlie Beach	8,791 vpd	1%	9,084 vpd
80181	Jubilee Pocket	5,337 vpd	0%	5,337 vpd
82848	Flametree	1,715 vpd	0%	1,715 vpd

Source: Queensland Government, 2014Traffic Census Data; Note ^ No historical data for this site

The 2014 data are illustrated graphically on **Figure 25-2**, which plots the AADT against the distance along Proserpine-Shute Harbour Road.

Figure 25-2. 2014 AADT – Proserpine-Shute Harbour Road.



The majority of traffic is generated around Cannonvale, which is the largest commercial and retail centre in the area. Traffic volumes near Shute Harbour are significantly lower than along the rest of the road, indicating that this section will be more sensitive to additional traffic loads.

25.4.2.1 Summary of Initial Traffic Assessment

Table 25-13 summarises the initial traffic demand estimations.

Table 25-13. Operations Delivery Assumptions.

Stage	Daily Trips
Construction Workforce (300 people)	59 light vehicle trips 10 bus trips
Construction Deliveries	70 heavy vehicles trips
Operations Workforce (300 people)	39 light vehicle trips 6 bus trips
Operations Deliveries	Not estimated

Figure 25-3 illustrates the relationship between development traffic and background traffic for the construction workforce trips.

Figure 25-3. Construction Workforce Trips – Proportionate Impact.

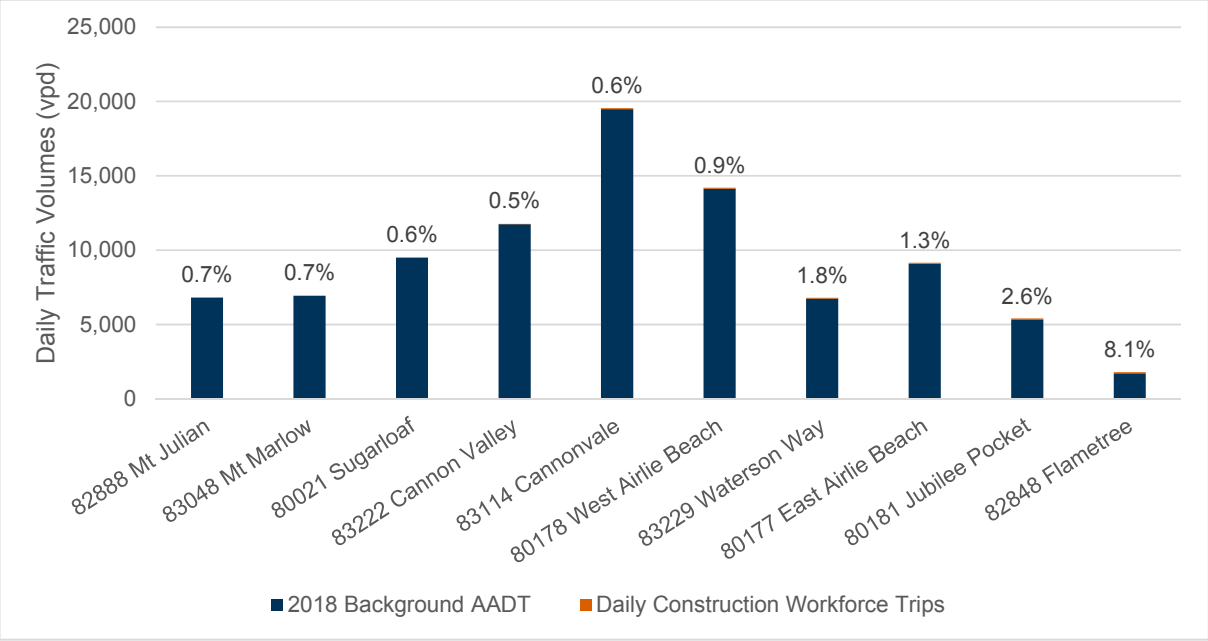


Figure 25-4 illustrates the relationship between development heavy vehicle traffic and background heavy vehicle traffic for the construction stage.

Figure 25-4. Construction Delivery Trips – Proportionate Impact (Heavy Vehicles).

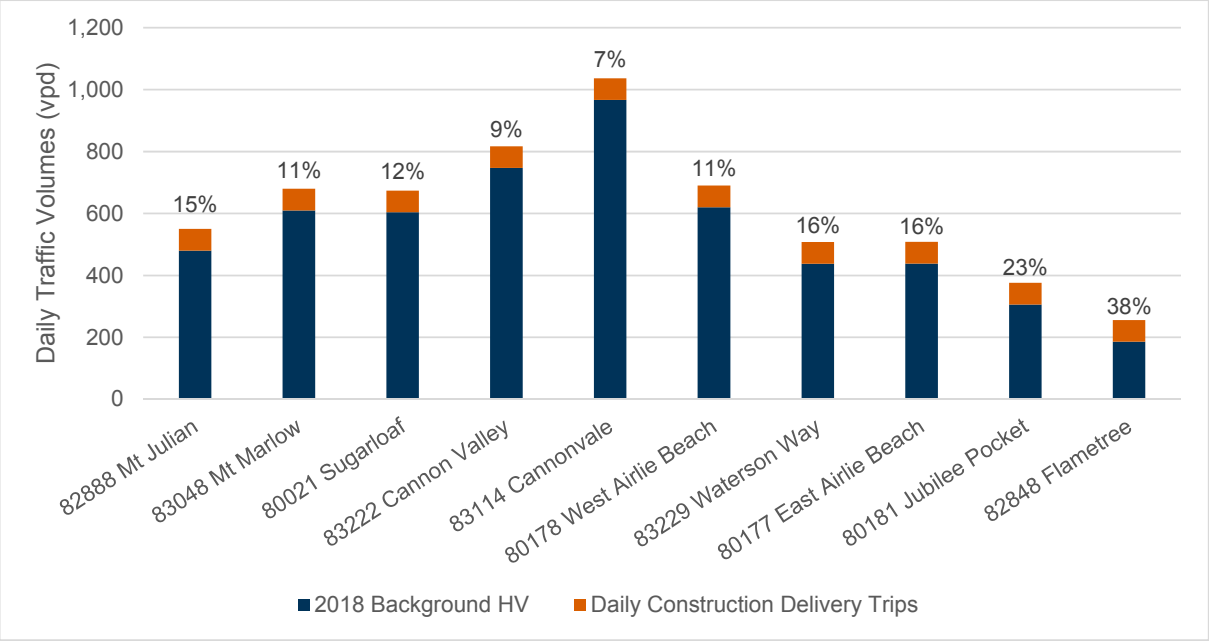


Figure 25-5 illustrates the relationship between development traffic and background traffic for the operations workforce trips.

Figure 25-5. Operations Workforce Trips – Proportionate Impact.

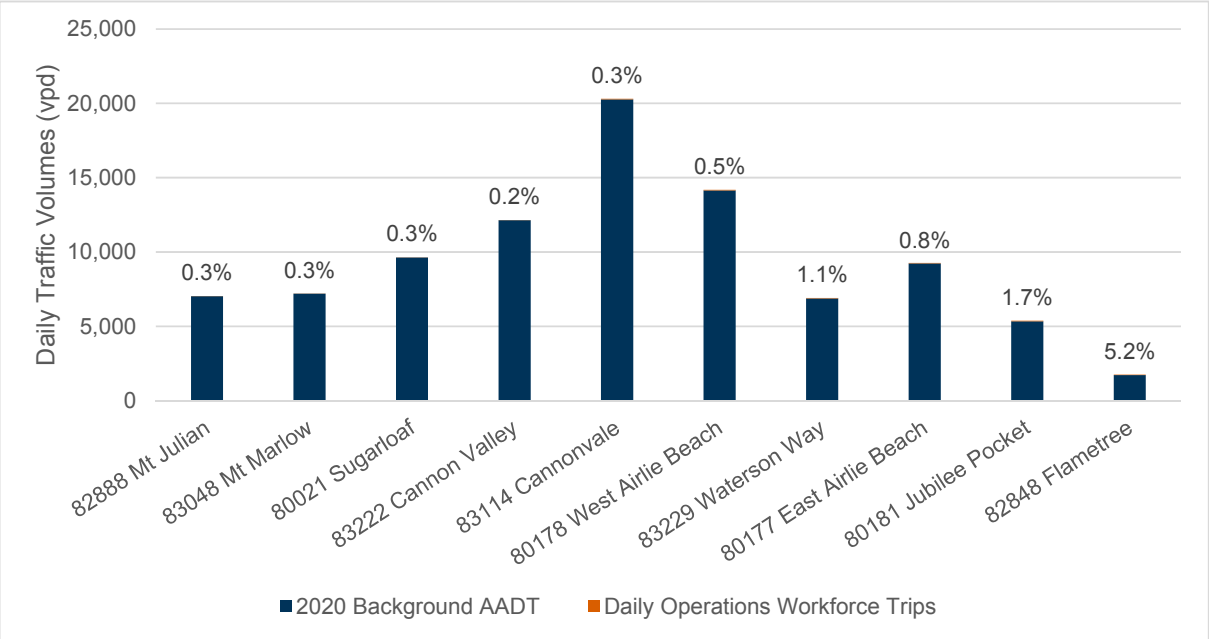


Table 25-14 summarises the scoping assessment results, highlighting those results indicating the 5% threshold has been triggered (equal to or greater than 5%). It indicates that the construction deliveries will impact along the entire length of Proserpine-Shute Harbour Road. With regards to workforce trips, a significant impact will be generated for the section between Flametree and Shute Harbour.

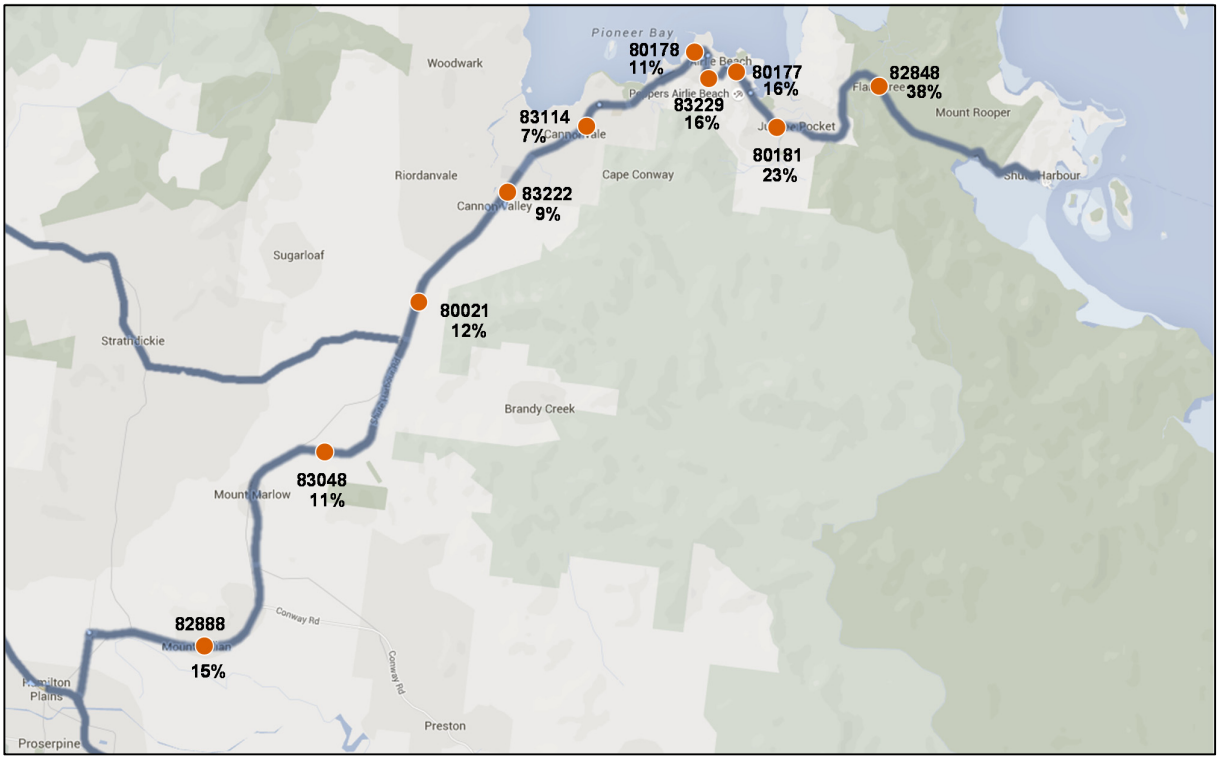
Table 25-14. Proportionate Impact of Project Traffic – Proserpine-Shute Harbour Road.

Count Site	Location	Construction (Peak at 2018)		Operations (2020)	
		Workforce	Deliveries (HV)	Workforce	Deliveries
82888	Mt Julian	1%	15%	0%	-
83048	Mt Marlow	1%	11%	0%	-
80021	Sugarloaf	1%	12%	0%	-
83222	Cannon Valley	0%	9%	0%	-
83114	Cannonvale	1%	7%	0%	-
80178	West Airlie Beach	1%	11%	1%	-
83229	Waterson Way	2%	16%	1%	-
80177	East Airlie Beach	1%	16%	1%	-
80181	Jubilee Pocket	3%	23%	2%	-
82848	Flametree	8%	38%	5%	-

25.4.3 Road Improvements and Mitigations

The construction traffic will have a significant impact on the study road network, particularly the heavy vehicle impact. **Figure 25-6** illustrates the count site locations along Proserpine-Shute Harbour Road alongside the proportionate impact from heavy vehicles due to construction activities.

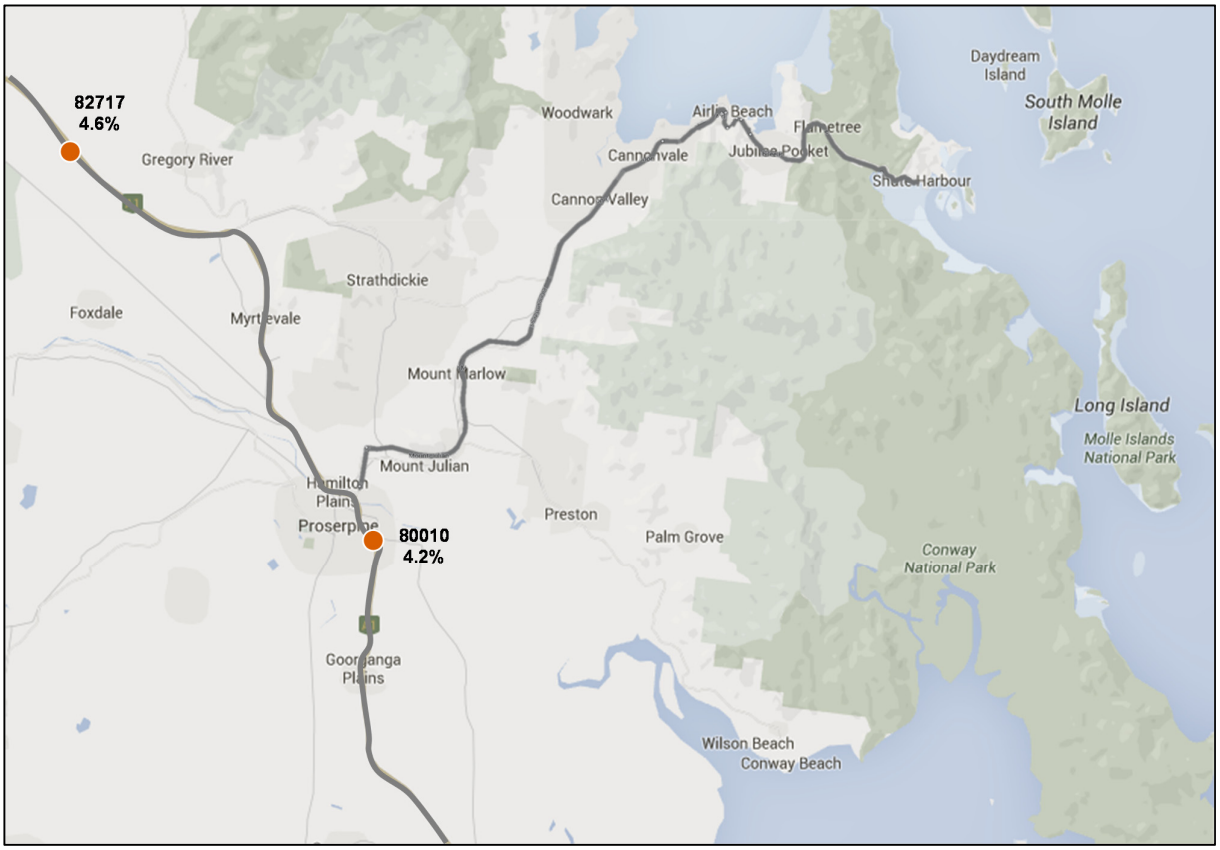
Figure 25-6. Count Site Locations and HV Impact – Proserpine-Shute Harbour Road.



Source: Google maps, www.maps.google.com.au

With regards to the Bruce Highway, the proportionate impact of the heavy vehicles is shown on **Figure 25-7. Count Site Locations and HV Impact – Bruce Highway.**

Figure 25-7. Count Site Locations and HV Impact – Bruce Highway.



Source: Google maps, www.maps.google.com.au

Until such time that assumptions regarding vehicle movements can be defined with more certainty, a pavement impact assessment should be delayed due to the potential variability of the outputs. It is recommended that the Coordinator General should condition that a scoping assessment and potentially a pavement impact assessment be undertaken in accordance with the *Guidelines for Assessment of Road Impacts of Development (GARID)* once these items have more certainty (approximately six months prior to construction). Advice from the Department of Transport and Main Roads has indicated that if the project scope does not change significantly, a final pavement impact assessment for the construction stage of affected sections of Shute Harbour Road will be adequate. On completion it will be provided to all relevant stakeholders for comment.

25.4.4 Parking Requirements

The parking requirements which affect the state controlled road network has been determined from those workers who drive themselves to Shute Harbour. The calculations outlined in this section of the EIS indicate that during construction, 13 workers drive themselves to/from Shute Harbour for each shift. Assuming a worst case scenario where workers leaving the island must wait for the next shift to arrive at the island before departing, this requires space for 26 vehicles parking on the mainland. Likewise for the operations, 8 workers have been calculated to drive themselves per shift, therefore space for 16 vehicles will be required on the mainland. Parking is already provided at Shute Harbour, however this is on a pay by the hour/day basis. Whether parking fees will be paid for by employees or the employer will be determined once a contractor has been appointed. If the latter, an option to negotiate parking permits for employees could be investigated.

25.5 Sea Transport

25.5.1 Proposed Marine Access

Marine access to Lindeman Island is currently available via a south-east facing jetty, which is exposed to the prevailing south-easterly winds, based on recorded data for Hamilton Island Airport. Wave conditions at the jetty exceed the "good wave" climate for vessels defined by AS3962 Guidelines for design of marinas for oblique seas of wave period (Tp) greater than 2s (Hs ≥0.3m) over 30% of the time (109 equivalent days per year). Therefore, based on the criteria contained in this code, on-site conditions would mean that it may not be safe for people to embark or disembark for 109 equivalent days per year, on average year (Hs ≥0.3m). However, larger vessels (>20m), such as a barge, are able to tolerate slightly higher waves and hence be affected by wave conditions less frequently. The smaller ferries that operate in this region are 25m long and the bigger catamaran is 35m long. For these vessels one can adopt Hs ≥0.4m as the limiting safe operation wave height. These conditions are equalled or exceeded for 18% of the time, about 66 equivalent days per year, on average.

The proponent originally proposed a safe harbour to provide reliable access for the transfer of guests via ferries, luxury vessels and private charters offering greater protection from the prevailing wind direction than currently available. Following a comprehensive site and ecological assessment, a number of alternative layouts were identified (refer to **Chapter 5**) with the proponent's preferred location being in the area surrounding the existing jetty and deepwater access channel. The proposed breakwaters, harbour works and channel batters were to be contained within an area of approximately 5.2 hectares.

As a result of the commencement of the Great Barrier Reef Marine Park Authority's (GBRMPA) Dredging Coral Reef Habitat Policy (2016), further impacts on Great Barrier Reef coral reef habitats from yet more bleaching, and the recent impacts from Tropical Cyclone Debbie, the proponent has been made aware that the prospects of gaining approval for the proposed safe harbour are remote. Therefore, the proponent no longer seeks to obtain approval to construct a safe harbour at Lindeman Island.

The proponent no longer seeks to obtain approval to construct a safe harbour at Lindeman Island. Instead the proponent seeks approval for upgrades to the existing jetty and additional moorings in sheltered locations around the island to enable the resort's marine craft to obtain safe shelter under a range of wind and wave conditions.

The existing jetty, moorings and barge landing facilities are located within the State and Commonwealth Marine Park in locations that minimise impacts on coral communities. Key aspects of the proposed design includes:

- The existing turning basin and access channel will be used for boat manoeuvring so that no disturbance of the fringing coral reef will be required;
- Vessels will not be permitted to empty bilges or waste water while using the jetty, barge or mooring facilities at the Lindeman Island resort to protect the marine environment. There is no intention to provide fuel or maintenance facilities;
- The jetty will be the key form of marine access for tourists and staff to/from the island;
- The jetty and barge landing point will be used to move supplies to the central receiving facility within the staff and maintenance precinct. The same operations will efficiently remove refuse from the island;
- Installation of seven approved mooring facilities in accordance with GBRMP Permit G13/35494.2;

- In the event of a cyclone boats would need to leave Lindeman Island and would be directed to the mainland harbours where they would require anchorage until the cyclone passes. As part of the resort's Cyclone Management Plan a Warning System is proposed to be developed which will identify the need to monitor Bureau of Meteorology warnings and seek advice as to when evacuation of boats from the island would be required; and
- Adjacent to the jetty, an arrivals lounge and cafe for guests arriving from vessels at the jetty or moorings, it is noted that the proposed arrivals lounge may require permits from the State/GBRMPA.

The following provides further information on the proposed marine access to the island with respect to a safe harbour no longer being proposed.

25.5.1.1 Jetty Upgrades

To improve the functionality of the existing jetty it is proposed to demolish approximately 45 metres of the existing timber and concrete jetty and replace it with a 30 metre x 6 metre floating ferry pontoon as shown in **Figure 25-8**. The pontoon will be connected to the remaining timber jetty by a 15 metre gangway, 2.4 metres wide to provide safe all tide access to the vessels. The structural integrity of the remaining jetty can be reviewed and upgraded as required to support the additional load from the gangway. The proposed pontoon will also provide short-term public access (e.g. set-down and pick-ups) to the island and National Park.

Refer to **section 4.12.9** for information regarding the construction of the jetty upgrade.

Figure 25-8. Current and proposed jetty layout.

25.5.1.2 Moorings

The proponent has a current GBRMPA permit (G13/35494.2) for seven moorings at Lindeman Island being GM0227, GM0228, GM0229, GM0230, GM0231, GM0232 and GMO233. As a safe harbour is no longer proposed the proponent seeks approval for additional moorings in sheltered locations around the island to enable the resort's marine craft to obtain safe shelter under a range of wind and wave conditions (refer to **Map 25-1**). The proposal includes new moorings at Lindeman Island. Privately owned moorings may not be installed without a permit from the Great Barrier Reef Marine Park Authority (GBRMPA) and Queensland Parks and Wildlife Service. The installation of any mooring, pontoon or tourist facility is subject to the application, assessment and decision-making processes under the Regulations for a relevant permission to install a mooring, pontoon or tourist facility or operate a tourist program. The processes under the Regulations include an assessment of the suitability of the proposed installation site for a mooring, pontoon or tourist facility. In addition, according to the Whitsunday Plan of Management, the Authority will only grant new permissions for moorings that will be installed within the setting 1 area of 'Lindeman Island Resort' (i.e. the designated area in front of the existing resort at Home Beach to the coastal 500 m line).

The proposed moorings would be located on soft sediment and at a sufficient distance beyond the reef edge to avoid potential harm to coral from the mooring structure and attachments and vessels. Mooring would be appropriately designed to accommodate the maximum load requirements (vessel sizes) and for minimising the risk of environmental damage, and design drawings would be approved or certified by a Registered Professional Engineer of Queensland. The precise mooring locations and designs within the setting 1 area would be take into account 'best-practice' guidelines as given in GBRMPA's 'Policy on Moorings in the Great Barrier Reef' and the 'Supporting information to the Policy on moorings in the Great Barrier Reef'. An application to GBRMPA for moorings would be submitted on approval of the EIS along with appropriate supporting documentation.

Additional proposed moorings to enable marine craft to obtain safe shelter under a range of wind and wave conditions

Existing Barge Ramp
Existing Jetty
15m x 2.4m Wide Gangway
Demolish Approx 45m of Existing Jetty
30m x 6m Floating Pontoon

Cardno
Shaping the Future

LEGEND

- Proposed Site Boundary
- Cadastral Boundary
- Approximate Location of Mooring Based on (GBRMPA Permit No. G13/35494.2)
- Additional Safe Weather Proposed Moorings (subject to GBRMPA Permit)
- Additional Proposed Moorings (subject to GBRMPA Permit)

N
W E
S

0 40 80 120 160 200
1:4,000 (metres)
original map compiled at A3 size

DRAWING TITLE	Proposed Jetty and Approved Moorings
DRAWING DATE	12 June 2017
DRAWING VERSION	2.0
COORDINATE SYSTEM	GDA 94; MGA Zone 55
MAP PRODUCED BY	Cardno QLD Pty Ltd
JOB NUMBER	HRP15078

DATA SOURCE

Google Earth: Date of Photography 07/03/2008.

Cadastral data: State of Queensland (Department of Natural Resources and Mines) 2015; Property Boundaries Queensland; Publication date: 02/04/2015.

Lindeman Great Barrier Reef Resort & Spa
ENVIRONMENTAL IMPACT STATEMENT

Proposed Jetty and Moorings

MAP 25-1

25.5.1.3 Boat Wash

Vessel wash has been put forward as one of many factors contributing to erosion of natural foreshore areas, which are vulnerable to short duration erosion events and longer term recession or accretion (AECOM 2010). In addition, mass transport of beach sediment in the direction of wave propagation occurs due to the wave orbital motion and the surface rollers in the breaker zone. The run-up height is higher for long-period boat-generated waves (e.g. larger vessels) than for natural wind waves with the same height. Thus, the swash zone of beaches has potential to become wider and higher due to waves from large vessels and biota on low-profile rock or coral reef platforms has potential to be physically damaged. This gives rise to a tendency of steepening of the cross-shore beach profile and sediment accumulation in the run-up zone. Profile steepening can be counteracted by natural waves to some degree.

Turbidity can be generated by large vessels' waves (which can also be a train of up to a dozen waves) but studies have shown that turbidity generally returns to ambient conditions quickly (within seconds or minutes) after the cessation of waves. During each event where vessel-generated waves increases turbidity, suspended sediment in the water column is likely to be transported long-shore according to tidal movement. Although there would be very little long-shore transport within each wave event, the effect would be incremental over time, so that sediment could be moved throughout the nearshore reef at Lindeman Island in front of the existing resort. Marine plants and coral require light to grow and survive and turbidity (suspended sediment) in the water column reduces light availability and causes a reduction in photosynthesis of these biota living in subtidal habitats. Suspended sediment can also lead to smothering and burial of biota from sedimentation. During the period of increased turbidity following vessel-generated waves there would potentially be localised reductions in light available to coral, seagrass and macroalgae (i.e. marine plants living in the water).

As the size and period of vessel wash is related to the speed at which vessels travel, slow vessel speed is a mitigation control that would be incorporated into the Resort Operational Management Plan. There will be a designed 'no wash zone' within 500 m of the jetty that includes signage controlling vessel speeds to 4 kts and keeping boat wash at negligible levels.

25.5.1.4 Barge Access

There is an existing all tide access barge landing ramp on Lindeman Island that was used by the former resort to move materials and equipment. It is proposed that this landing point also be used during the construction and operational phase of the upgraded resort. No further infrastructure or disturbance of the fringing reef is required.

25.5.1.5 Capital and Maintenance Dredging

The existing access channel will be used by vessels to access the jetty and barge landing and as such no capital dredging will be required. Maintenance dredging is unlikely to be required (except after a major cyclone) due to low rates of sediment transport under ambient conditions.

25.5.1.6 Impacts / Risks on Maritime Safety

The main risk on maritime safety is the risk of marine vessel accidents during the construction and operational phases of the project. The causes of a marine vessel accident could be due to any of the following:

- Loss of control of vessel;
- Operator error;

- Adverse weather conditions; and
- Poor visibility.

The consequences of a marine vessel accident could be any of the following:

- Human injury or loss of life;
- Contamination of marine waters (hydrocarbons and other contaminants); and
- Damage to marine ecology.

The control measures to be implemented for the project to prevent or minimise marine vessel accidents are as follows:

- A Cyclone Contingency Plan is to be developed in consultation with the Regional Harbour Master;
- No storage of hazardous materials will be allowed;
- No refuelling facilities will be provided;
- Navigation aids will be installed as directed by Maritime Safety Queensland (MSQ);
- Boat recovering procedures to be put in place;
- All moored vessels will be required to be equipped with hydrocarbon spill kits; and
- Emergency spill clean-up equipment will be provided at the jetty.

Vessel Management Planning

The marine access facility will provide for barges and ferries up to 40 metres overall length.

Operational Vessel Management

Recreational vessel management will be the responsibility of resort management. The existing entrance channel will be utilised to access deep water thereby avoiding areas of good quality coral The existing access is considered adequate to cater for the proposed maximum vessel size vessels to be accommodated, namely 40 metres maximum pleasure craft and 40 metres maximum ferries and supply barges.

Construction Vessel Management

During the construction phase materials and equipment are required to be transported to the island. Construction is proposed over a period of 3 years. A major proportion of construction activity will be within the first 18 months. This will include construction of the jetty upgrade, airstrip and the resort buildings. Management of vessel movements in and out of the upgraded jetty and barge land facility would be formulated in consultation with the Regional Harbour Master and other MSQ staff as required to ensure safe and acceptable operating procedures. Consultation will also take place with local recreational fishermen, GBRMPA and DEHP as part of the planning of appropriate schedules and routes to minimise potential impacts.

Any mooring of construction equipment within mainland harbours and island sheltered areas again would be formulated in consultation with the Regional Harbour Master. Appropriate vessel mooring lighting will be required to ensure navigational safety within these areas.

Management Plans

The proponent will consult with MSQ and the Regional Harbour Master before starting any construction work on the Island to confirm requirements regarding management plans under the *Transport Operations (Marine Safety) Act 1994*. It is likely that the management plans will:

- Identify, describe and evaluate all likely impacts on navigational safety and vessel-sourced marine pollution resulting from proposed development;
- Identify and describe proposed mitigation measures to manage any impacts;
- Identify and describe funding requirements and financial guarantees necessary for the successful delivery and operation of the proposed mitigation measures for the project lifecycle; and
- Identify and describe the proposed ownership model of any marine infrastructure and supporting systems.

The proponent will regularly consult with the Regional Harbour Master when developing these plans to ensure local requirements are addressed.

(a) Marine Execution Plan

A Marine Execution Plan will include detailed information about the following for the proposed development project during its construction stages:

- All development related or construction vessels and their operations; and
- The relevant impacts of the development construction on the availability of navigable waterway to existing vessel traffic.

The Marine Execution Plan will include and consider all requirements for the following plans, but for the construction stages of the proposed project:

- Vessel Traffic Management Plan;
- Aids to Navigation Management Plan; and
- Vessel-sourced Pollution Prevention Management Plan.

Alternatively, these plans can include the required information for the construction and operation stages of development. The Regional Harbour Master will be consulted to advise on the required format in accordance with the *Transport Operations (Marine Safety) Act 1994*.

(b) Vessel Traffic Management Plan

The vessel traffic management plan will include information about the following for the project(construction and operation):

- Changes and increases to local vessel traffic resulting from the proposed development project; and
- Methods of cumulative vessel traffic management for the proposed project, to ensure safety of navigation at all times.

For the operational stages of the development, the plan will include details about:

- The type and size of vessels;

- Frequency of movements;
- Proposed patterns of operation; and
- Existing and proposed navigational channels or waterways.

The Vessel Traffic Management Plan will also consider:

- Under keel clearance allowance;
- Cyclone and other extreme weather procedures, including weather limits for suspension of marina operations; and
- Tidal information, as relevant.

(c) Aids to Navigation Management Plan

Aids to navigation includes physical and virtual aids to navigation and vessel traffic services provided by MSQ's vessel traffic service (VTS) centres. The Aids to Navigation Management Plan shall include information about the following for the project:

- Possible impacts from the project on the operations of existing aids to navigation (for example, physical or electronic interference);
- Any changes to existing aids to navigation required;
- Any new aids to navigation required; and
- Infrastructure and services required for the proposed project to ensure safety of navigation at all times.

For the operational stages of the development, the Aids to Navigation Management Plan will also include details about:

- The type of systems and infrastructure required, following consultation with the RHM;
- Changes needed to existing VTS systems and infrastructure (description, location, networks);
- Operational and maintenance requirements; and
- Lifecycle costs and funding schedules.

(d) Vessel-sourced Pollution Prevention Management Plan

Vessel-sourced pollution includes ballast water, garbage, chemical or toxic waste disposal and sewage. The Vessel-sourced Pollution Prevention Management Plan will include information about the following for the project:

- Any changes to existing vessel-sourced pollution prevention systems required;
- Any new vessel-sourced pollution prevention systems required; and
- Infrastructure and measures required for the proposed project, once built and operating, to ensure compliance at all times.

For the operational stages of the development, the Vessel-sourced Pollution Prevention Management Plan should also include details about:

- The type and characteristics of any systems or infrastructure required, following consultation with the RHM;

- Operational and maintenance requirements; and
- Lifecycle costs and funding schedules.

Statement of Commitments

The proponent will detail all identified resolutions in the proponent's statement of commitments as included in **Appendix D – Proponent Policies and Commitments**. A statement of commitments will also address details of funding and how it will be provided over the lifecycle of the project, as well as the method of addressing the ownership of the required marine infrastructure assets.

Summary

It is recognised that management, particularly during construction, needs to be co-ordinated with MSQ to ensure safe maritime operations are maintained. It is also clearly understood that MSQ will need to review navigational aid requirements and any interim measures including mooring of vessels and equipment during the construction phase.

25.5.2 Existing Marine Traffic

Lindeman Island is located within 35 kilometres of Shute Harbour. The nearest mainland harbours are Abell Point Marina and Port of Airlie, approximately 50 kilometres from the island. There is also a marina on nearby Hamilton Island, approximately 15 kilometres away from which reef tours depart on a regular basis. It is therefore reasonably assumed that mainland marine traffic impacts would be substantially confined to Shute Harbour and Port of Airlie, the coastal waters between the island, the mainland and the region's other island and reef destinations.

Existing levels of vessel activity have been assessed and existing traffic primarily comprises the following:

- Trailerable (day) boats;
- Commercial vessels including charter, fishing and ferries;
- Private vessels moored within Shute Harbour, Abell Point Marina, Port of Airlie Marina and Hamilton Island Marina.
- Transient cruising vessels.

Trailer Boats

There are well established boat ramp and car trailer facilities at Shute Harbour and Airlie Beach (refer to **Figure 25-9** - **Figure 25-11)**. These launching facilities provide all-tide vessel launching and retrieval. The existing boat ramp at Whisper Bay, Airlie Beach has recently had a rock breakwater constructed by the Whitsunday Shire Council to provide all-weather protection (refer to **Figure 25-11**).

Figure 25-9. Shute Harbour Boat Ramp (Source: Nearmap).

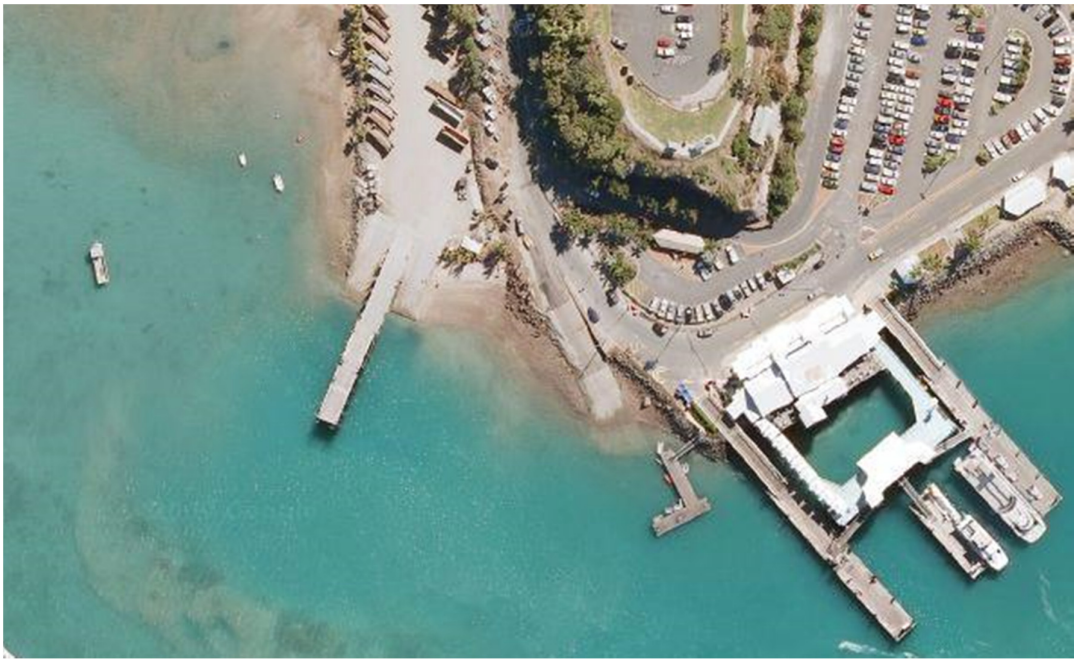


Figure 25-10. Whisper Bay Boat Ramp (Source: Nearmap).

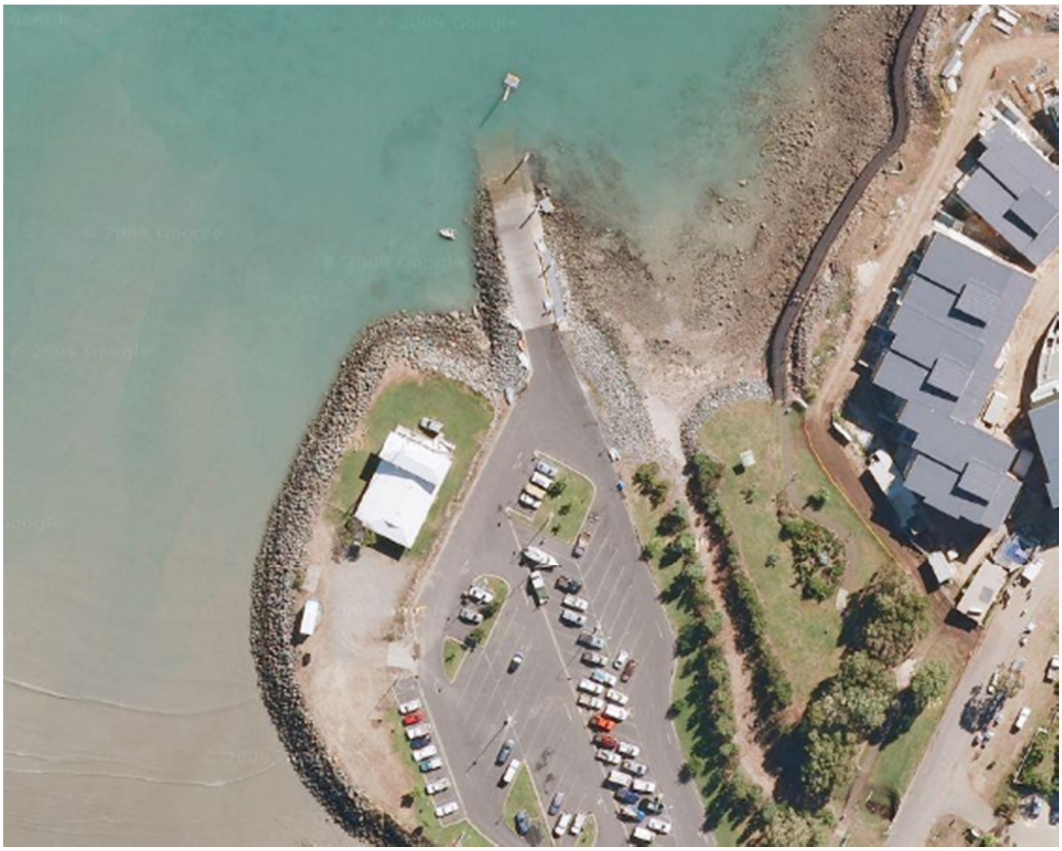


Figure 25-11. Whisper Bay Breakwater.

The majority of the area's trailerable vessel activity originates from these two facilities. Trailer boat activity is heavily weather dependent with peak activity corresponding to favourable (calm, sunny) conditions. Typical activity is characterised in **Table 25-15** which is based on data available from Whitsunday Regional Council.

Table 25-15. Trailerable Vessel Activity.

Vessel Launchings	Conditions
10 to 15	Average week day
60 to 70	Average weekend day
20-30	Good weather week day
Up to 100	Good weather weekend day
Up to 10	Poor weather week day
40 to 50	Poor weather weekend day
300 plus	Excellent weather public holiday (similar to school holiday rates)

Source: Whitsunday Regional Council

It is estimated that approximately 25 percent of these activities would comprise day boaters who would be likely to make Lindeman Island or surrounding islands their destination. The remaining 75 percent primarily comprise fishing activities within the immediate coastal waters, islands and reefs.

Abell Point Marina

There are over 500 marina berths in the Abell Point Marina ranging in size from 12m – 60m primarily accommodating privately owned vessels (refer **Table 25-16)**. The marina has 2,500m^2 of associated retail and commercial tenancies. It includes a comprehensive range of marina related facilities and support services including services for electrics and electronics, marine mechanics, dive shop and associated services, brokerage, chandlery and rigging, haul out facilities, boat yard and sails repair.

Table 25-16. Abell Point Marina (Source: Nearmap).

Vessel activity is highly weather dependant with week day activity much lower than the weekend. It is estimated that on good warm weather weekend days, up to 20 percent of vessels would depart the Abell Point Marina. Typically during the week days in good weather, around fifteen private vessels would depart the Abell Point Marina per day.

Hamilton Island Marina

There are approximately 300 berths up to 60m in the Hamilton Island Marina, primarily accommodating privately owned vessels along with a range of jet ski hire and reef tours operating (refer to **Figure 25-12**). The marina has a comprehensive range of facilities including a fuel jetty and a boat yard with a 60 tonne travelift, providing anti-fouling, mechanical and electrical services, shipwrights, professional boat care specialists and chandlery. Hamilton Island also has annual keelboat regatta in August which is one Australia's largest offshore yachting regattas with approximately 250 boats competing each year.

Figure 25-12. Hamilton Island Marina (Source: Nearmap).

Port of Airlie Marina

There are approximately 180 berths planned for the Port of Airlie Marina from 10 metres to 50 metres for both monohull and multihull vessels, primarily accommodating privately owned vessels (refer to **Figure 25-13**). The marina has a comprehensive range of facilities including a boat ramp, restaurants / cafes / retail outlets, ferry terminal and a fuel wharf.

Figure 25-13. Port of Airlie Marina (Source: www.portofairlie.com).

25.5.3 Commercial Vessels

There are approximately 75 commercial vessels operating within the Abell Point Marina which primarily comprise charter vessels. In addition, Abell Point marina provides two ocean rafting tours as well as jetski and boat hire. The existing ferry activity comprises more than 10 trips per day from either Port of Airlie Marina or Shute Harbour to the Whitsunday Islands. Typical passenger numbers are around 150 persons per trip. Hamilton Island has licenced a range of operations to conduct marine activities for the island guests who are based in the marina. Tour operators offering excursions to Whitehaven Beach, the Great Barrier Reef and the other Whitsunday Islands also depart from the marina. Cruise Whitsundays which provides Day Cruises and Island Resort Connections now operates out of their new, custom built maritime terminal at the Port of Airlie Marina (refer **Figure 25-14**). They offer daily trips to the Great Barrier Reef from Port of Airlie, Daydream Island and Hamilton Island.

Figure 25-14. Cruise Whitsundays Ferry Terminal (source: www.portofairlie.com).

25.5.4 Vessel Registration Statistics

Vessel registration statistics for Queensland have been reviewed and are shown in **Table 25-17.**

Table 25-17. Vessel Registrations – Queensland.

Year	Total Registrations	Change from Previous Year
2015	253144	+ 1.16%
2014	250230	+ 1.97%
2013	245390	+ 1.73%
2012	241216	+ 1.75%
2011	237066	+ 1.50%
2010	233554	+ 2.05%
2009	228869	+ 2.92%
2008	222381	
	Total % Increase	13.83%

Vessel statistics for the Region have been reviewed to ascertain regional base data and trends. Annual registration data is sub-divided into five (5) regions. This analysis reviews data for the Mackay Region as show in **Table 25-18**.

Table 25-18. Vessel Registrations – Mackay Region.

Year	Total Registrations	Change from Previous Year	Registrations up to 8m	Change from Previous Year	Registrations over 8m	Change from Previous Year
2015	19510	- 0.34%	18671	- 0.27%	839	- 1.87%
2014	19576	+ 0.07%	18721	+ 0.14%	855	- 1.50%
2013	19562	+ 1.68%	18694	+ 1.86%	868	- 2.03%
2012	19238	+ 3.48%	18352	+ 3.72%	886	- 1.23%
2011	18591	+ 3.21%	17694	+ 3.46%	897	- 1.43%
2010	18013	+ 0.46%	17103	+ 0.73%	910	- 4.41%
2009	17931	+ 2.63%	16979	+ 2.74%	952	+ 0.63%
2008	17472		16526		946	
	Total % Increase	+ 11.66%	Total % Increase	+ 12.98%	Total % Increase	- 11.31%

As detailed above, vessel registrations in the region since 2008 have experienced continued strong growth of 11.66%, slightly below the Queensland figure of 13.83%. It is noted however that there has been a decline in the larger vessels of around 10% since the Global Financial Crisis in 2008.

25.5.5 Increase in Marine Traffic

Increases in vessel activity due to the proposed development are predicted as follows.

Trailer Boats

There is expected to be continued growth in trailerable boats in the Region commensurate with growth in vessel registrations. Noting that around 75 percent of trailer boat activities are for fishing and others enjoy "away from the crowd" destinations, it is expected that the Lindeman Great Barrier Reef Resort will not have a significant effect on trailerable boat activity.

Marina Vessel Activity

With the proposed additional moorings, vessel activity regionally will marginally increase. It is not expected that mainland-based recreational or charter vessel activity will be significantly affected by the Lindeman Island redevelopment primarily due to the ease and preference of access to mainland boating facilities versus travelling to the island to do so.

Charter vessel movements generated by the redevelopment of Lindeman Island would be expected to comprise a daily fishing/dive charter and several daily excursions and tours around the Whitsunday Islands.

Watersports Activities

Water-sports activities associated with the resort are expected to comprise a small number of kayaks, windsurfers, jet skis, one or two person off-the-beach sailing catamarans and one or two water-sports powerboats for tube rides and parasailing. These activities would be essentially confined to the sheltered

waters adjacent to the resort. The proponent has an existing GBRMPA Permit G13/35494.2 which provides approval for the use of kayaks (11), windsurfers (29) and catamarans (9) in accordance with the permit conditions.

Barge Traffic

Currently, with the island's resort not operating, there are no regular barge services to the island. During construction it is estimated that four barge trips per week day would be required for civil and building works. The existing concrete barge ramp will be utilised during the island's major civil and building works. Four barge trips per week day are expected during the period of major construction activity. Regular barge trips will be required for the Resort's provisioning and servicing following completion of the construction phase. One barge per day is expected to be required for supplies to the island including return trip waste removal as required.

Ferry Traffic

The proposal provides for an estimated population of 858 visitors and staff per day, including 300 staff. Regular ferry service requirements are essential for the successful operation of the Resort. It has been estimated that 25 percent of hotel, villa and apartment occupants would arrive/depart by plane, with all staff to arrive by ferry. The remaining 75 percent of resort guests (and 100 percent of staff) would depart by ferry from the Port of Airlie Marina or Shute Harbour as would day visitors and commuting staff. Based on the above, it has been estimated that the average daily passenger arrivals/departures by ferry would be approximately 257 people (42 staff per day and 215 visitors per day assuming a three day average occupancy). It is envisaged that this level of passenger demand would be serviced by extending the current Cruise Whitsundays Ferry services to include Lindeman Island.

25.6 Air Transport

The existing aerodrome is intended to be upgraded as part of the overall project. The design parameters that have been nominated for physical infrastructure and obstacle limitation surfaces have been determined in consideration of significant constraints associated with potential environmental impacts, topography and desirable development opportunities external to the aerodrome site. Code 1B non-instrument, day only (take-off and landing from the south), is the greatest scope of operations contemplated within *CASA's Manual of Standards Part 139—Aerodromes* that can feasibly be accommodated on the site, subject to the resolution of some potentially significant issues including geometric design, airspace protection, site boundaries and environmental impacts. Code 1B aircraft such as Beechcraft 200 King Air, DHC-6 Twin Otter and Dornier 228-200 have been nominated for consideration in order to scope the maximum size of aircraft potentially capable of using the aerodrome if it is constructed to comply with code 1B standards, subject to runway length, obstacles, runway slope and various other take-off performance planning considerations. The eventual runway length will be influenced by the cost of construction, the cost of achieving compliance with the applicable regulatory requirements including geometric design and airspace protection, the extent of the site available for development and the cost of environmental impacts, amongst a number of relevant considerations.

Assuming the location of the northern end of the runway as currently shown is fixed due to some or all of the considerations noted above, there is potential to extend the length of runway available for take-off and landing in a southerly direction by constructing the runway up to the edge of the parking apron, and, subject to operational restrictions on the parking apron, may also include the eastern part of the parking apron. The maximum runway length that can be achieved (nominally 966 metres for take-off and landing in a southerly direction or possibly up to 1,042 metres subject to operational procedures acceptable to CASA) may still not enable the nominated aircraft to operate to their full payload/range capabilities.

Refer also to discussion of alternative airstrip options as included in **Chapter 5** of the EIS.

25.6.1 Planning context

The Queensland Government established the State Planning Policy (SPP) to define the specific matters of state interest in land use planning and development. To support the implementation of the SPP, each state interest in the SPP is supported by a state interest guideline, such as the Strategic Airports and Aviation Facilities (July 2014). Appendix 1 of the Strategic Airports and Aviation Facilities guideline defines a strategic airport as:

> *…an airport that is considered by the state to be essential to the national and state air transport network or the national defence system.*

Table A of Appendix 1 of the Strategic Airports and Aviation Facilities guideline lists the strategic airports. The airports on this list within 30 nautical miles of the project site (where the Project site is within the horizontal extent of the airports' operational airspace) are Proserpine (50 km) and Hamilton Island airports (13 km). Part C of the Strategic Airports and Aviation Facilities guideline is titled Application of interim development assessment requirements. Extracts of Part C is provided below:

> A development proposal should not adversely impact on the operational safety and viability of strategic airports by creating obstacles or compromising aircraft safety in operational airspace. This policy outcome will be achieved if:
>
> - Development does not include or create a permanent or temporary physical or transient obstruction in a strategic airport's operational airspace:

- The terrain elevation present on Lindeman Island will not be exceeded by an object due to any activity associated with the Project and so this element is achieved;
- The project is not expected to emit smoke, dust, ash, steam, or gaseous plumes exceeding 4.3 m per second that will encroach Proserpine or Hamilton Island Airport's operational airspace;
- Apart from the OLS for Hamilton Island, the project is located outside of all protection areas associated with aviation facilities;

- Development does not include or create external lighting or reflective surfaces that could distract or confuse pilots:
  - The Project will be restricted to operations during day light hours only and will not be fitted with runway lights. Therefore, it is unlikely that the Project will result in a visual hazard to pilots;
- Emissions from a development do not significantly increase air turbulence, reduce visibility or compromise the operation of aircraft engines in a strategic airport's operational airspace:
  - The Project will not create objects large enough to create a significant increase in air turbulence. The hills on Lindeman Island surrounding the Project site are likely to remain the main causes of any wake turbulence that may be generated from the vicinity.
- Development does not significantly increase the risk of wildlife hazards in a strategic airport's operational airspace.
  - The Project is an extension of land uses already present on Lindeman Island. It is on the outer extremity of the 13 km boundary of the nominated hazard area, and is not expected to substantially increase the risk of wildlife hazards on Hamilton Island's operational airspace.

It can be concluded that Proserpine Airport and Hamilton Island Airport are recognised as strategic airports under the SPP and that the policy outcome will be achieved, which is that a development proposal should not adversely impact on the operational safety and viability of strategic airports by creating obstacles or compromising aircraft safety in operational airspace.

25.6.2 Other potential impacts

In addition to the abovementioned considerations with respect to the State Planning Policy, this assessment considers other potential aviation impacts of the Project due to proximity of the Project to Hamilton Island Airport. Hamilton Island Airport is 7 nm to the north west of the Project site. The applicable aviation infrastructure associated with the aerodrome consists of navigational aids facilities, terminal instrument procedures and associated PANS OPS surfaces, obstacle limitation surfaces (OLS) and an air traffic control (ATC) service for class D controlled airspace (only active during certain times). Each of the abovementioned aspects of the applicable infrastructure at Hamilton Island Airport are discussed in further detail in the following sections.

25.6.2.1 Navigational aids

Navigational aids (VOR/DME) are provided for aircraft operations at Hamilton Island Airport. These navigational aids are located approximately 800 m north east of the runway and approximately 13.8 km (7.5 nm) to the north of the site. As addressed in the above section, the Project site is outside of any protection areas associated with navigational aids and, therefore, the Project will not impact on these facilities.

25.6.2.2 Terminal instrument procedures and PANS-OPS surfaces

Terminal instrument procedures and associated PANS-OPS surfaces are provided at Hamilton Island Airport. These procedures include Distance Measuring Equipment (DME) Arrival and VHF Omni Directional Radio Range (VOR), area navigation ((RNAV (RNP)) and RNAV (GNSS) approach procedures for both runway 14 and 32. These procedures were designed and implemented in consideration of the presence of the terrain on Lindeman Island (peaking at approximately 213 m AHD). As addressed in the above section, the Project will not result in any obstructions above the height of the highest terrain. Therefore, the project will not impact on the PANS-OPS surfaces associated with the terminal instrument procedures at Hamilton Island Airport.

25.6.2.3 Obstacle limitation surface

The take off and approach surfaces to the south of Hamilton Island Airport overlay the Project site. There are areas of terrain (peaking at approximately 213 m AHD) on Lindeman Island that penetrate the 154.5 m AHD approach surface. There is no penetration of the overlaying areas of the take-off surface over the Project site. The Project includes the implementation of a code 1B OLS for a non instrument day only runway, suitable for aircraft up to Beechcraft 200 King Air, DHC-6 Twin Otter and Dornier 228-200, subject to runway length available and aircraft performance requirements.

The dimensions of this OLS, in addition to other aerodrome dimensions, are copied the table below.

Table 25-19. Aerodrome Dimensions for Code 1B (non-instrument day only).

Aspect		Code 1B non-instrument day only
Minimum runway length (subject to aircraft performance requirements)		<800 m
Minimum runway width		18 m
Runway strip width – graded		60 m
Total runway strip width (includes flyover)		60 m
Runway strip length (beyond runway)		30 m
Runway end safety area		Not required
Taxiway width		10.5 metres
Taxiway strip width (total) each side of CL		21.5 m
Taxiway strip width (graded) each side of CL		12.5 m
Taxilane separation from object		4.5 m
Approach Surface	Width inner edge	60 m
	Divergence	10%
	Length	1600 m
	Gradient	5%
	Distance from threshold	30 m
T/O Climb Surface	Width inner edge	60 m
	Divergence	10%
	Length	1600 m
	Gradient	5%

This OLS may result in overlapping and/or intersecting with the Hamilton Island Airport OLS. The effect of this outcome is improved airspace protection due to increased obstacle height restrictions. Surrounding terrain may penetrate the inner horizontal and conical surfaces of the OLS for the Project runway. These penetrations restrict aircraft operations at the Project site to hours of day light only. The code 1B OLS will also result in penetrations of critical surfaces, including the transitional and approach surfaces. These surfaces must not be penetrated by obstacles.

25.6.2.4 Air traffic control services

An air traffic control (ATC) service for class D airspace is provided at Hamilton Island Airport. The ATC tower operating hours, and class D activation times, are in accordance with aeronautical information publications (AIP) or NOTAMs. At the time of writing this assessment, the current NOTAM (NOTAM identifier: c132/15) indicates that the ATC tower and associated class D airspace are active daily from 9 am to 3:10 pm eastern standard time (GMT+10). The Project site is located within the class D airspace controlled by Hamilton Island Airport's ATC and, when class D airspace is not active, the Project site is located within uncontrolled (class G) airspace. Class C (radar controlled) airspace is continuously active above 4500 ft AMSL.

The aerodrome on Lindeman Island is currently operational (aircraft are currently able to land and take off on the runway). Pilots operating at Lindeman Island are advised to communicate on Hamilton Island Airport's radio VHF frequencies. When class D airspace is active, aircraft operating at Lindeman Island are subject to ATC clearance. Outside of Hamilton Island Airport's ATC operating hours (when Lindeman Island is surrounded by class G, uncontrolled airspace), procedures apply associated with common terminal area frequency (CTAF) and operating aircraft at non-controlled aerodromes. These procedures enable pilots to effectively communicate with other pilots operating in the vicinity in order to operate in an environment not controlled by ATC to an acceptable level of aviation safety.

The nature of the impact of the Project on Hamilton Island Airport operations is likely to be similar to the status quo, although the scale of the impact would be increased as aircraft operations increase in aircraft size and frequency of movements. During times when class D airspace is active, an aircraft would be required to effectively communicate with Hamilton Island Airport's ATC on the ground at the site.

25.7 Resort Transportation Network

Transportation between the resort facilities will be undertaken by pedestrian access, golf carts and service vehicles. The pathways are designed for service vehicles and electric golf carts and will be narrow with discrete passing zones to minimise site disturbance (refer to **Map 25-2**). Guests arriving by sea or air will be met at the arrivals pavilions by golf carts to be transported directly to their rooms. Each of the main central facility buildings include golf cart parking and recharge areas.

Cardno
Shaping the Future

LEGEND

- Primary Buggy, Pedestrian and Bicycle Network
- Secondary Buggy, Pedestrian and Bicycle Network
- Tertiary Buggy, Pedestrian and Bicycle Network
- Porte Cochere
- Airport Lounge
- Buggy Parking
- Buggy Charging Station

Other

- Site Boundary

N, W, E, S

0 75 150 225 300 375

1:7,500 (metres)

original map compiled at A3 size

DRAWING TITLE	Map 25-1: Proposed Traffic Circulation
DRAWING DATE	20 December 2016
DRAWING VERSION	2.0
COORDINATE SYSTEM	Unprojected Geographics
MAP PRODUCED BY	Cardno QLD Pty Ltd
JOB NUMBER	HRP15078

DATA SOURCE

Basemap: DBI Masterplan; Date: 04/05/2016.

Lindeman Great Barrier Reef Resort & Spa

ENVIRONMENTAL IMPACT STATEMENT

Proposed Traffic Circulation

MAP 25-2

25.8 Potential Impacts and Mitigation Measures

The following table provides an assessment of potential impacts and mitigation measures associated with transport.

Table 25-20. Risk assessment matrix – transport.

Potential Impact	Significance of Impact: Unmitigated	Mitigation Measure			Significance of Impact: Mitigated
		Design	Construction	Operation	
Impact of construction traffic on road pavement.	Medium (6)	-	• Undertake pavement impact assessment in accordance with the Guidelines for Assessment of Road Impacts of Development (GARID) once required inputs have more certainty.	-	Low (4)
Vehicle accidents associated with construction and operation traffic..	Extreme (20)	• Ensure roads are designed to comply with the relevant Australian Standards.	• Dangerous goods and wastes associated with the demolition phase will be transported in accordance with regulatory requirements. • Ensure all drivers have undertaken appropriate safety training. • Heavy or hazardous vehicle movements are limited to daytime hours. • Minimise congestion effects by staging construction works. • Provision of buses for the transportation of construction workforce to reduce impact on parking facilities at Shute Harbour.	• Ensure all drivers (including resort guests) have undertaken appropriate safety training. • Ensure appropriate signage of speed. • Maintain all resort vehicles. • Heavy or hazardous vehicle movements are limited to daytime hours.	Medium (6)
Marine vessel accidents and spills from marine vessels.	Extreme (20)		• Prepare and comply with Marine Execution Plan; • Aids to Navigation Management Plan. • Dangerous goods and wastes associated with the demolition phase	• Comply with Marine Execution Plan; Aids to Navigation Management Plan. • Designation of 'go slow' zones. • Generate and implement boat	Medium (6)

Potential Impact	Significance of Impact: Unmitigated	Mitigation Measure			Significance of Impact: Mitigated
		Design	Construction	Operation	
			will be transported in accordance with regulatory requirements.	recovery procedures. • Resort Tours Management Plan prepared and actioned as part of the EMP. • Any boat strikes or strandings reported to management and relevant agencies. • No storage of hazardous material in the jetty precinct. • Sympathetic lighting strategies included in the design of resort and marina infrastructure. • Provision of a Spill Management Plan. Spill kits shall be made available and provision of a SDS register shall be provided relating to all hazardous substances on board. • No refuelling of vessels permitted; • Regular inspections of vessel to prevent drips, leaks or failures.	
Aircraft or Runway Incident associated with malfunctions, severe weather, pilot error or collision.	Extreme (20)	• Airstrip are to be designed in accordance with relevant CASA and Australian standards.	• Airstrip constructed in accordance with relevant CASA and Australian standards.	• Provision of emergency firefighting and spill clean-up facilities. • Obstacle Limitation Surfaces shall be maintained around the airstrip. • Aircraft maintenance schedules are up to date and maintained. • All personnel are trained in emergency plans.	Medium (6)

Potential Impact	Significance of Impact: Unmitigated	Mitigation Measure			Significance of Impact: Mitigated
		Design	Construction	Operation	
				• Fauna friendly fencing allowing egress of fauna but preventing ingress. • Supervision of airstrip area.	

25.9 Summary

The project involves the construction and operation of the resort and ancillary uses, which is anticipated to attract tourism from overseas and nationally. The resort will comprise visitor accommodation, recreation and leisure sites as well as accommodating staff on-site. The logistics of the project anticipate that the majority of deliveries and staff movements will originate on the mainland with connection to the island gained by barge or ferry from Shute Harbour.

A scoping assessment for the state controlled road network has determined that the project will have significant construction traffic impacts on the state controlled road network and further assessment will be required. It is noted that the operations deliveries have not been estimated due to a lack of information with regards to the anticipated operations. With respect to workforce trips, a significant impact will be generated for the section between Flametree and Shute Harbour. In terms of delivery trips, relating to heavy vehicles, the entire length of Proserpine-Shute Harbour Road will need to be assessed, as all sections exceed the 5% threshold. Until such time that assumptions regarding vehicle movements can be defined with more certainty, a pavement impact assessment should be delayed due to the potential variability of the outputs. It is recommended that the Coordinator General should condition that a scoping assessment and potentially a pavement impact assessment be undertaken once these items have more certainty.

The construction process and upgrades to the jetty will be co-ordinated with Maritime Safety Queensland to ensure safe maritime operations are maintained.