



# Queensland Recreational Boating Facilities Demand Forecasting Study 2017



## Livingstone - Rockhampton Regional Assessment



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# Definitions

'all-tide' means that a vessel can be realistically launched into or retrieved from the waterway at the site for 100% of the tidal range

'ARI' means average recurrence interval, and refers to the average or expected time period between two occurrences of weather exceeding a certain magnitude

'capacity' means the ability to handle throughput for boat ramps, or the ability to handle multiple vessels at pontoons and floating walkways

'CHMP' means Cultural Heritage Management Plan

'CPM Reg' means the *Coastal Protection and Management Regulation 2003*

'CTU' means 'car-trailer unit', and applies to parking bays suitable for use by a tow vehicle with attached boat trailer

'DEE' means the Department of the Environment and Energy (Commonwealth)

'DEHP' means the Department of Environment and Heritage Protection

'demand' means the current or projected requirement at a given year to service the needs of the recreational boating community – assuming full effectiveness of existing facilities and based on current numbers of registered recreational boats only. Excludes non-registered vessels such as canoes, kayaks, sail-boards, row boats, powered vessels not requiring registration, etc.

'Demand' in this study is primarily about meeting the statistically relevant needs of the wider boating community. Construction agencies consider demand of other types (local area, political requests, lobby groups, tourism, regional growth, bright ideas) as part of making investment decisions

'effective capacity' for a boat ramp means the number of lanes for boat ramps after adjusting for usage constraints such as the lack of adequate parking or tidal accessibility, or improvements to efficiency such as floating walkways or pontoons, see section 4.1.1 for additional detail

'effective capacity' for a landing means the number of landings after adjusting for usage constraints caused by tidal and depth restrictions, see section 4.2.1 for additional detail

'EPBC Act' means the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)

'FHA' means Fish Habitat Area

'GBR' means Great Barrier Reef

'IDAS' means Integrated Development Assessment System

'landings' means jetty and pontoon structures that facilitate direct berthing of non-trailable vessels (keel boats and >8.0m powerboats), transient vessels and/or tenders from larger vessels (where effective anchoring or mooring is available nearby)

'land-side' refers to infrastructure constructed above high water mark

'LGA' means local government area

'LSC' means Livingstone Shire Council

'MCU' means a material change of use under the planning scheme

'MIIP' means the TMR works program known as the Marine Infrastructure Investment Program, with the government's Marine Infrastructure Fund forming its capital component

'MNES' means matter of national environmental significance under the EPBC Act

'NC Act' means the *Nature Conservation Act 1992*

'near all-tide' means that a vessel can be realistically launched into or retrieved from the waterway at the site for at least 80% of the tidal range

'NNTT' means National Native Title Tribunal

'P Act' means the *Planning Act 2016*

'P Reg' means the *Planning Regulation 2017*

'part-tide' means that a vessel can be realistically launched into or retrieved from the waterway at the site for at least 50% of the tidal range

'registration activation rate' means the percentage of registered vessels liable to be in use on any given good weather weekend day

'RRC' means Rockhampton Regional Council

'shd' means schedule

'shortfall' means the outstanding number of boat ramp lanes or landings as appropriate (assuming announced TMR projects/upgrades at December 2016 have been built) required to satisfy demand at a particular year, after adjustment for actual number and effective capacity considerations. A negative number for shortfall in a table signifies an oversupply

'SPL' means strategic port land

'Study' means this document including appendices and the state-wide summary

'TMR' means the Department of Transport and Main Roads

'water-side' refers to infrastructure constructed below high water mark

'WHA' means World Heritage Area

# means 'number' when used in tables

# Executive summary

This study sets out the current and future demand for publicly accessible recreational boating facilities within the Livingstone – Rockhampton region over the next 20 years. For the purposes of this study, the Livingstone – Rockhampton region comprises the Livingstone Shire Council and Rockhampton Regional Council local government areas (LGA). The assessment considers facilities for vessels, such as boat ramps and floating walkways, as well as landings for deep-draught vessels. It is intended to be used to inform funding priorities from 2018-19 onwards.

## *Key issues for the Livingstone – Rockhampton region*

The primary issues raised by stakeholders around access to recreational boating facilities in the region centred on:

- a lack of sheltered facilities for all-tide (or near all-tide), all-weather access, particularly to access open water
- a lack of deep-draught landings towards the north of the region, particularly in the Thirsty Sound area
- overcrowding and congestion, particularly at Rosslyn Bay
- safe navigation
- the impact of fishing and other water-based recreational activities on the local economy
- co-ordination between Rockhampton and Livingstone LGAs.

## *Demand assessment*

The demand assessment is based on boat registrations from within the Livingstone and Rockhampton local government areas, and contributions from surrounding LGAs. The demand assessment is analysed against existing capacity, to produce an outstanding shortfall projection. Key aspects influencing demand considered in the assessment include:

- The population of Livingstone Shire Council is projected to increase from 37,055 persons in 2016 to 55,691 persons in 2036, or by 2.1% per annum, which is above the state-wide five year forecast average of 1.6% (Appendix C).
- The population of Rockhampton Regional Council is projected to increase from 81,589 persons in 2016 to 99,104 persons in 2036, or by 1.0% per annum. This is below the average Queensland growth rate of 1.6% over the next five years.
- The population of the combined Livingstone-Rockhampton area is projected to increase from 118,644 in 2016 to 154,795 persons in 2036, or by 1.3% per annum. This is just below the average Queensland growth rate of 1.6% over the next five years. This indicates continued growth in demand for boating facilities in the wider region.
- Boat registrations in the region are highest for boats up to 4.5 metres in length.
- Trailable and non-trailable vessel registrations within the Rockhampton region are mostly for vessels used on the water within the region, with some leakage/export in usage to Gladstone Regional Council and Isaac Regional Council areas. This leakage is generally to access fresh water facilities.
- Vessel inflows from outside the region are from the Gladstone Regional, Banana Shire, Central Highlands Regional, Isaac Regional and Woorabinda Aboriginal Shire Councils, and interstate.

- There is significant demand for recreational boating infrastructure in the region as a result of tourism, particularly in the Yeppoon area, and in response to increased fishing tourism across the region as a consequence of improved fish catches and fishing marketing after the declaration of the area as a net-free zone.
- The registration activation rate from residents from Livingstone Shire LGA is anticipated to be high (14%) as a result of an older average age than the Queensland state average and its classification as “very remote” under the Accessibility/Remoteness Index of Australia, while Rockhampton Regional LGA is anticipated to be average (10%) due to Rockhampton’s designation as a regional centre. Both LGAs have a relatively high incidence of blue collar workers compared to the state average.

### Boat ramps

At present, there are 18 boat ramp facilities in the Livingstone – Rockhampton region, containing 34 boat ramp lanes, however the lack of parking for car-trailer units (CTU) or limited tidal access at some locations means that the effective capacity of these ramps is 26.8 lanes. Once infrastructure currently under construction or planned for implementation by 2017-18 is in place (referred to as Marine Infrastructure Investment Program (MIIP) upgrades), this effective capacity increases to 30.8 lanes.

To address any shortfall between demand and current capacity, existing facilities were further assessed to identify what type of access the facility provides to the two main destinations, being either open-water or non-open-water. This then allowed identification of the type of additional facilities needed to address demand.

The projected boat ramp lane shortfall for the region is shown in Table 1.

Table 1 – Projected boat ramp lane shortfall including planned upgrades, Livingstone – Rockhampton region

Evaluation category*	Existing effective capacity*	2016		2021		2026		2036	
		Demand	Shortfall	Demand	Shortfall	Demand	Shortfall	Demand	Shortfall
Open-water access	13	19.2	6.2	20.5	7.5	22.1	9.1	25.7	12.7
Non-open-water access	17.8	14.3	-3.5	15.3	-2.5	16.5	-1.3	19.2	1.4
<b>Total</b>	<b>30.8</b>	<b>33.5</b>	<b>2.7</b>	<b>35.8</b>	<b>5.0</b>	<b>38.6</b>	<b>7.8</b>	<b>44.9</b>	<b>14.1</b>

\*Refer section 4.1.2 and Table 6 for detailed evaluation categories

\*Existing effective capacity incorporates MIIP announced projects/upgrades as at December 2016, being Robert Clark Drive, Callaghan Park in North Rockhampton, which is under construction at the time of writing

\*See Appendix B and Table 6 for capacity assessment

## Landings

The assessment of capacity and shortfall in landings is shown in Table 2 and Table 3.

Table 2 – Existing landing capacity, Livingstone – Rockhampton region

Evaluation category	Existing effective capacity
# of public sheltered mainland landings*	4
# of public island landings – supplies available	0
# major private landings*	2
<b>Total</b>	<b>6</b>
<b>Facilities not contributing to recreational capacity:</b>	
# of public unsheltered mainland landings	0
# of public island landings – no supplies available	0

\*public sheltered mainland landings comprise three jetties in Rosslyn Bay Boat Harbour and the Derby Street jetty in Rockhampton city

\*private landings include marinas and clubs, accessible by fee for deep-draught vessels, and by arrangement, limited access for tender dinghies (varies with private entity, some free)

Table 3 – Projected landing shortfall, Livingstone – Rockhampton region

Evaluation category	Existing effective capacity*	2016		2021		2026		2036	
		Demand	Shortfall	Demand	Shortfall	Demand	Shortfall	Demand	Shortfall
# of landings*	6	6	0	7	1	7	1	8	2

\*# of landings consists of public sheltered mainland landings, public island landings – supplies available and major private landings

This assessment indicates that at present the public landings network in conjunction with the supplementary capacity provided by commercial or club landings is adequate to cater for existing demand, however an additional two landings will be required in the future.

## Recommended priorities

Refer to Table 4 for the Livingstone – Rockhampton region recommended priorities.

Recommended priorities to increase capacity and meet demand have been defined over the following time scales:

- Priority 1 (P1) These sites are needed to meet existing demand.
- Priority 2 (P2) Assuming that the priority 1 sites are implemented, these sites are expected to be needed to meet additional demand over the five years ending 2021.
- Priority 3 (P3) Assuming that the priority 1 and 2 sites are implemented, these sites are expected to be needed to meet additional demand over the subsequent five years, that is 2021 to 2026.
- Priority 4 (P4) These sites are those that will meet future demand, but are not expected to be required before 2026 in demand terms but may be brought forward for construction for other reasons.



Table 4 – Recommended priorities to increase capacity, Livingstone – Rockhampton region

Priority	Sites
Priority 1 (as soon as possible)	New facility at Thompson Point – construct a near all-tide or all-tide 2-lane ramp, and formalise all-weather parking for 45 CTU spaces.
	Stanage Bay – extend ramp to improve tidal access, construct rock breakwater to shelter ramp and install floating walkway to act as a landing and for ramp queuing.
	Rossllyn Bay – increase parking by approximately 33 CTU spaces to improve efficient use of the existing water-side infrastructure and satisfy approvals agencies that Rossllyn Bay is being optimised prior to moving to a greenfield site.
	New facility at Port Alma: Option 1 – a 4-lane ramp with a floating walkway and 90 CTU spaces at Casuarina Creek. <u>OR</u> Option 2 - two new facilities at Port Alma, both comprising a 2-lane ramp with a floating walkway and 45 CTU spaces, one at Casuarina Creek, and one at Inkerman Creek Reclamation works at both sites are required. Decommission existing 2-lane Port Alma facility.
Priority 2 (over the next five years)	A new 4-lane open-water facility on the Capricorn Coast – refer to section 7.9 for potential options.
Priority 3 (over the next five to ten years)	Corbetts Landing – upgrade facility to a near all-tide or all-tide 2-lane ramp, and formalise parking for 45 CTU spaces. This recommendation recognises that Corbetts Landing remains distance-limited for access to the open sea, and will be primarily used for estuarine access.
Priority 4 (other)	A second new 4-lane open-water facility on the Capricorn Coast – refer to section 7.9 for potential options.
	Additional pontoon – site dependent on selection of new 4-lane open-water facility. Causeway Lake option could allow for new pontoon. Alternatively, installation of a public pontoon in Rossllyn Bay Boat Harbour could be considered.
	Quay Street, Rockhampton – installation of a flood-resistant pontoon associated with decommissioning of the Derby Street jetty.

# 1. Introduction

## 1.1 Background

GHD was commissioned by the Department of Transport and Main Roads (TMR) to establish the current and future demand for recreational boating facilities throughout Queensland. This resulting study is the *Recreational Boating Facilities Demand Forecasting Study 2016* (Study) and supersedes the 2011 study of similar name. The study replaces the *Recreational Boating Facilities Demand Forecasting Study 2016* by incorporating the results of the 2016 census.

The Study will be used to inform planning for the development of existing and new recreational boating facilities by a variety of agencies, including TMR, the Gold Coast Waterways Authority, local government, and port and water authorities. The Study is one tool in a broader assessment process to select and prioritise sites for development. Specifically, the Study is not binding in any way on the agencies it is designed to assist. The Study establishes demand and makes informed suggestions as to how the established demand might be addressed. The 2011 study, at December 2016, has had 66% of its recommendations adopted to a greater or lesser extent. A similar recommendation take-up rate may be expected from this study.

This regional report is one of a series of reports for the Study comprising LGA and state-wide components. The state-wide report details the Study background and provides an overview of demand for recreational boating facilities over the next 20 years throughout the state. The state-wide report complements individual reports for each local government area (LGA). Each LGA report (and this regional report combining two LGAs) identifies existing capacity, current and future demand, and potential opportunities for boating infrastructure within the LGA – with appropriate adjustment for interaction with adjacent LGAs.

The Livingstone – Rockhampton region has been identified as an area where recreational boating facilities are heavily used by adjoining LGAs. This regional report combining two LGAs has been prepared to provide context for and improve clarity of the wider demand for facilities in the area.

## 1.2 Context

This report has been prepared with a focus on in-water recreational facilities and infrastructure comprising boat ramps, floating walkways and landings within the region, which are publicly accessible by registered vessels. Car and CTU parking can significantly constrain the efficient use of a facility, and has been considered in the assessment. However, facilities used more than 50% of the time for commercial or public passenger transport (e.g. ferry terminals), private facilities (such as yacht clubs and marinas), and general recreational facilities such as canoe ramps and fishing platforms are not included as part of this study.

The types of infrastructure considered in the assessment of capacity are:

- boat ramps used for the launching and retrieval of vessels
- supporting infrastructure for the boat ramp:
  - queuing facilities (floating walkways, pontoons, queuing beaches)
  - parking for car-trailer units (CTUs)
- short-term landings accessible by deep-draught or non-trailable vessels on the outer face, or their tenders (for longer term tying up) on the inner/landward face or ends.

There may be instances where a public pontoon serves multiple purposes – as a short-term landing, as a tender tying up facility, and as a queuing facility for a boat ramp.

## 2. Regional overview

The key characteristics and influences on recreational boating within the Livingstone – Rockhampton region include:

- The area is dominated by key industries of tourism, agriculture and port services supply industries acting through Port Alma, supporting agriculture, mining, and minerals processing in the wider region.
- The population of Livingstone Shire Council is projected to increase from 37,055 persons in 2016 to 55,691 persons in 2036, or by 2.1% per annum, which is above the state-wide five year forecast average of 1.6% (Appendix C).
- The population of Rockhampton Regional Council is projected to increase from 81,589 persons in 2016 to 99,104 persons in 2036, or by 1.0% per annum. This is below the average Queensland growth rate of 1.6% over the next five years.
- The population of the combined Livingstone-Rockhampton area is projected to increase from 118,644 in 2016 to 154,795 persons in 2036, or by 1.5% per annum. This is just below the average Queensland growth rate of 1.6% over the next five years. This indicates continued growth in demand for boating facilities in the wider region.
- Windy weather significantly reduces the annual number of days that are suitable for offshore boating.
- There is an accepted/known shortfall in open-water access, all-tide, protected boat launching facilities and notable pressure on the existing facilities on good-weather days.
- There is well-established demand from Rockhampton residents for facilities in Livingstone Shire that provide access to offshore areas. These facilities cover all of the Capricorn Coast, lower reaches of the Fitzroy River, and Port Alma.
- Under the remoteness measures for LGAs used by the Australian Bureau of Statistics, Livingstone Shire is considered to be very remote, while Rockhampton Regional is classified as a regional centre.
- Both council areas have a relatively high incidence of blue collar workers compared to the state average.

## 3. Existing facilities

### 3.1 Overview of existing facilities

Within the region, existing recreational boating facilities are owned and managed by several organisations, shown in Table 5.

A map indicating the location of existing facilities is included as Appendix A.

Appendix B contains a summary capacity assessment of these existing facilities.

Table 5 – Recreational boating facilities\* within the Livingstone – Rockhampton region

Infrastructure owner	Boat ramps		Landings	
	Facilities	Lanes	Pontoons	Jetties
TMR mainland (other than state boat harbours)	16	29	0	0
TMR mainland (state boat harbour)	2	8	0	3
TMR island	0	0	0	0
Livingstone Shire Council	0	0	0	0
Rockhampton Regional Council	1	1	0	1
Private landings (marinas/clubs)	N/A	N/A	2	0
<b>Total</b>	<b>19</b>	<b>38</b>	<b>2</b>	<b>4</b>

\*Includes Robert Clark Drive, Callaghan Park, North Rockhampton, which is under construction at the time of writing (October 2017).

Important or popular public boat ramp facilities are located at:

- Rosslyn Bay Boat Harbour
- Svendsen Road, Zilzie (Coorooman Creek)
- Port Alma (Raglan Creek)
- Quay St, Rockhampton (Fitzroy River)
- Ski Gardens, Rockhampton (Fitzroy River, above the barrage)

Existing ramp facilities (including minor ones not mentioned above):

- service the main coastal population centres in the Yeppoon and Emu Park areas
- service the key inland population centre of Rockhampton
- provide open-water access, or access to fresh water and estuarine reaches of the numerous river and creek systems – some facilities providing access to both, such as Port Alma.

Research referenced in the previous demand assessment study (GHD, 2011)<sup>1</sup> indicated that boat owners were prepared to travel up to approximately one hour to reach major or preferred marine infrastructure. In many locations, this infrastructure is represented by facilities that provide all-tide, or near all-tide, open-water access.

Between the NSW border and Port Douglas, TMR has therefore adopted a long term strategy to provide access to an all-tide or near-all-tide sheltered facility within a one-hour drive time along the coast where practical. Exceptions to the strategy include where all-tide or near-all-tide sheltered access is not feasible.

All-tide, sheltered open-water access is provided from the facilities at Rosslyn Bay and Port Alma, which are both within a one-hour drive of the Yeppoon/Emu Park and Rockhampton main population areas. Stanage is the only coastal township that is outside the one-hour drive time, however TMR investigations indicate that the best that can be achieved in this location is partial sheltering of a part-tide boat ramp and landing, that can be used with prior planning to take tides into account.

<sup>1</sup> GHD (2011) Recreational Boating Facilities Demand Forecasting Study. Report prepared for TMR, September.

The public deep-draught vessel landings within the region comprise three jetties within Rosslyn Bay Boat Harbour, and the Derby Street jetty on the Fitzroy River in central Rockhampton. The Rosslyn Bay jetties are primarily used by commercial vessels, but do receive usage from recreational vessels. The Derby Street jetty is exposed to flood flows, it is only occasionally used by recreational vessels. This is likely due to jetties being generally less attractive to boaties than the modern alternative of pontoons.

## 3.2 Key issues and hotspots

The primary issues raised by stakeholders pertaining to access to recreational boating facilities in the Livingstone – Rockhampton region centred on accessibility (from land and from the sea), capacity, inter-LGA coordination, and safety.

### 3.2.1 Accessibility

A key issue raised by stakeholders is the lack of sheltered launching/retrieval facilities that provide all-weather, all-tide access for all trailable boat sizes. This is especially critical for facilities that provide offshore access. On “flat water days” (that is, when the weather conditions are fine, with light winds and low wave action), demand for launching/retrieval facilities is very high. These days are not frequent. Estuarine areas are generally sheltered and attract greater use on windy days, but are not always accessible by larger boats, or at all stages of the tide.

The quality of the road access to popular facilities was noted, in particular for Coorooman Creek and Nerimbera, where the unsealed access roads are a deterrent to many owners of fibreglass boats, who expressed concern that stones flicked from the wheels of their own or passing vehicles will damage their boats.

Access for deep-draught vessels or their tenders to a landing in the Stanage Bay/Thirsty Sound area was raised. It is a long journey by sea north from Rosslyn Bay to Mackay, and Stanage Bay is one of few populated places mid-way to break the journey. Thirsty Sound is a popular anchorage, with basic provisions including fuel available nearby. A landing in the area would improve access between land and vessels and boost the economic development of the local area, which may justify future sealing of the approximately 80km section of the access road from the Bruce Highway.

### 3.2.2 Facilities capacity

Overcrowding at Rosslyn Bay was raised by many stakeholders. Most of the overcrowding occurs because this facility is the only facility servicing the Livingstone – Rockhampton region situated on the open coast that provides direct, sheltered, all-tide access to open-water and the popular Keppel Island group. On flat-water days, the existing CTU parking is insufficient to match demand. Anecdotally, ramp users have been fined for parking illegally on verges and traffic islands, and many ramp users report that they now make the decision not to go boating. This situation is expected to worsen as the population of the area grows.

Port Alma was also raised as an area of concern for Rockhampton residents, particularly as demand for sites providing all-tide open-water access is anticipated to increase following the introduction of net-free fishing zones in the region. The quality of recreational fishing is expected to increase.

Overall, stakeholders perceive that there are insufficient facilities to meet local demand for open-water access.

### 3.2.3 Regional coordination

Due to the position of the administrative boundaries of Rockhampton Regional Council and Livingstone Shire Council and the road network, most Rockhampton residents use Rosslyn Bay or Coorooman Creek in Livingstone Shire for direct access to open-water. This places a substantial amount of pressure on Livingstone Shire to cater to this demand.

A coordinated approach to planning, funding and managing recreational boating facilities in the Rockhampton and Livingstone LGAs is necessary to suitably and equitably provide appropriate and timely facilities.

### 3.2.4 Safety

The safe use of ramps was identified as an issue at several facilities. The main concerns related to the steepness or narrowness of the ramps, safe access to open-water through mobile estuarine creek entrances, and the proximity of the Port Alma ramp to potential hazards from port activities.

At estuarine sites, crocodile attack is of concern during launching and retrieval, especially where users may need to enter the water to get their vessel off or onto the trailer. Many boat ramps display signage alerting users to crocodile dangers and recent sightings. Floating walkways are popularly requested to partially manage this risk.

At Port Alma, concerns have been raised around the risk to ramp users from the port's explosives handling operations. The port authority and the Department of Natural Resources and Mines wish to relocate the Port Alma ramp to improve separation between recreational and port activities.

## 4. Capacity assessment

### 4.1 Boat ramp capacity

The function of a boat ramp is to provide access for launching and retrieval of trailable vessels into a waterway. Alternative launching facilities such as boat stackers are outside scope for this study.

#### 4.1.1 Boat ramp capacity evaluation

For the purposes of this study, boat ramp capacity is measured as “effective” boat ramp lanes. An effective boat ramp is quantitatively characterised as being:

- capable of accommodating 40 launch/retrievals per lane per day (in accordance with Australian Standard AS 3962<sup>2</sup> and Economic Associates (2011)<sup>3</sup>)
- supported by landside infrastructure such as queuing and manoeuvring areas
- supported by an appropriate number of CTU parking spaces.

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<sup>2</sup> AS 3962-2001 Guidelines for the design of marinas

<sup>3</sup> Economic Associates (2011) Recreational Boating Facilities Demand Forecasting Study: Demand Analysis

The number of launch/retrievals per lane per day has been selected based on the relevant Australian Standard and Economic Associates (2011)<sup>3</sup>. This latter report summarised research undertaken by SKM (1988)<sup>4</sup> and Rose et al (2009)<sup>5</sup>, and stated that a rate of 30 boats per lane per day is considered to provide unhampered overall amenity, whereas a rate of 50 boats per lane per day represents congested operations. A midpoint of 40 launches/retrieves per day was therefore selected to represent a balanced scenario.

TMR (2016)<sup>6</sup> provides guidance on its standard/reference number of CTU spaces to match boat ramp lanes:

- 90 CTUs for four-lane ramps
- 70 CTUs for three-lane ramps
- 45 CTUs for two-lane ramps
- 15 CTUs for one-lane ramps with sealed road access
- 10 CTUs for one-lane ramps with all-weather, unsealed road access.

The above figures indicate an average relationship of 22.5 CTU spaces per “effective” lane. The TMR reference standards differ from the number of CTU spaces recommended for public boat launching ramps by AS 3962. That standard requires between 20 and 60 CTU spaces per ramp lane, depending on whether the ramp is in an urban or rural area, whether it has a queuing structure, and whether it has separate rigging and de-rigging areas. For local reasons, TMR may vary from these reference figures in particular cases.

The actual capacity, or “effectiveness” of a boat ramp is unique for each ramp, and is affected by:

- a reduction in the amount of time a ramp is available for use due to tidal variability, how far into the water the ramp physically extends, and navigable depths – at each ramp being measured as the % availability of the tidal range that a vessel can be realistically launched or retrieved – with ramps classified as all-tide (100%), near all-tide (>80%), and part-tide (50%) for access – and the reduction in availability occurring either:
  - at the ramp itself, and/or
  - in access channels connecting the ramp to the sea/open water (such as at a river mouth or other channel depth constraint)
- the exposure of the ramp to regular, and sometimes major, wave action – these facilities tending to be beach ramps that are generally only suitable for short excursions in small boats in good weather and with suitable tides – accordingly these ramps are considered to be available only 50% of the time
- factors impacting efficient vessel launching and retrieval cycles, which include:
  - provision of queuing facilities such as pontoons, floating walkways or beaches – with such queuing facilities increasing the capacity of a boat ramp by providing a place for a vessel to be secured during vehicle parking or retrieval without blocking a ramp lane, leading to greater throughput
  - constrained or difficult manoeuvring of vehicles and trailers onto the ramp
  - long distances between the boat ramp and CTU parking spaces

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<sup>4</sup> SKM (1988) Public Boat Ramps Central Queensland Strategic Plan, Volume One, demand forecasting – Noosa to Yeppoon

<sup>5</sup> Rose, T., Powell R., & Yu J. (2009) Identification of the Present and Future Recreational Boating Infrastructure in Redland City – A 10 year Infrastructure Plan, Griffith University

<sup>6</sup> TMR (2016) Marine Facilities and Infrastructure Plan

- the physical extent of infrastructure provided, such as:
  - the width and number of ramp lanes
  - the number of CTU parking spaces within the facility
  - provision for overflow parking during busy periods.

To calculate effective lanes at a boat ramp, the following adjustments have been applied to water-side infrastructure:

- all-tide – no change (that is, multiplication factor of 1.0)
- near all-tide – available 80% of the time (that is, multiplication factor of 0.8)
- part-tide – available 50% of the time (that is, multiplication factor of 0.5)
- beach ramp – available 50% of the time (that is, multiplication factor of 0.5)
- access to a queuing facility in the form of a floating walkway – increase efficiency by 50% (that is, multiplication factor of 1.5)
- access to a queuing facility such as a gangway-access pontoon – increase efficiency by 20% (that is, multiplication factor of 1.2).

Access to a beach, while convenient, is not suitable for all vessel sizes or preferred by some vessel owners, and therefore has not been considered to improve the capacity of a boat ramp.

As an example, the water-side effective lanes for a near all-tide, two-lane boat ramp with a floating walkway will be calculated as:

2	x	0.8	x	1.5	=	2.4
lanes		tidal availability		queuing structure		effective lanes

To calculate the land-side constraint on effective lanes, the following CTU groupings have been applied:

- 1 to 9 CTU – 0.5 effective lanes
- 10 to 20 CTU – 1 effective lane
- 21 to 29 CTU – 1.5 effective lanes
- 30 to 39 CTU – 1.8 effective lanes
- 40 to 54 CTU – 2 effective lanes
- 55 to 64 CTU – 2.5 effective lanes
- 65 to 75 CTU – 3 effective lanes
- 76 to 83 CTU – 3.5 effective lanes
- 84 to 97 CTU – 4 effective lanes
- 98 to 105 CTU – 4.5 effective lanes
- 106 to 117 CTU – 5 effective lanes
- 118 to 127 CTU – 5.5 effective lanes
- 128 to 140 CTU – 6 effective lanes
- 141 to 149 CTU – 6.5 effective lanes
- 150 to 157 CTU – 7 effective lanes.



Unmarked or unformed parking areas are denoted accordingly. The number of CTU parking bays may also be the limiting factor on effective capacity, owing to the number of bays provided being less than the TMR reference standard.

The calculation is illustrated further in Appendix B, which details the actual and effective lanes for each facility.

The effective capacity of a facility is therefore limited by the constraining or “bottlenecking” element, and to realise full capacity a facility must balance the land-side and water-side capacities. The capacity assessment in Appendix B also identifies the limiting capacity constraint for each facility.

#### 4.1.2 Boat ramp classification

As previously discussed, each boat ramp is subject to a unique set of constraints and opportunities, particularly in relation to tidal accessibility. To understand how well existing boat ramp facilities meet current demand, consideration has also been given to the recreational destination(s) accessed by each facility. Where available, this has been informed by local knowledge on actual usage.

Regardless of the tidal range available at the ramp itself, boat ramps typically seek to cater to one or more of the following destinations:

- access to the sea for fishing, diving, islands, jet skiing, and general recreation
- access to creeks and estuaries for fishing, crabbing, skiing and general recreation
- access to fresh water for fishing, skiing, jet skiing, and general recreation.

However, there are some practical limitations on the usage of a ramp for these purposes. These include:

- vessel size, as:
  - Small vessels are unsuitable for use in open and exposed waters under most conditions, although they may be taken into nearshore waters in calm conditions or for short journeys. These vessels are most suited to use in protected waterways such as creeks and estuaries.
  - Large vessels suited to offshore use may be physically constrained in very narrow or shallow waterways, such as the upstream reaches of creeks or estuaries.
- travel time to destination, as:
  - Although navigable access from a boat ramp to open water may be possible, it may not be practical due to the distance travelled by water and/or any speed restrictions that may be in place for the waterway. Most people will seek to launch at the facility that takes the least time to reach their destination. This is particularly the case for offshore destinations where larger volumes of fuel must be paid for and carried to allow for the journey.

Discussions with local government stakeholders throughout the state indicated that vessels longer than 4.5m were generally used to access offshore areas, with smaller vessels tending to be used for creek and estuary access. There will be circumstances where smaller vessels will be used to travel offshore and larger vessels will stay in protected waters.

At facilities where open-water access becomes difficult, the Study assumes that the facility will be more frequently used for accessing local creeks, estuaries, and freshwater areas. Facilities have therefore been classified into one of the following categories to reflect the primary level of accessibility between the ramp and open water:

- open-water access – all-tide access
- depth-limited – access to open-water possible but navigation limited at certain stages of the tide by water depth, for example, crossing a tidal bar, or sand shoals in an estuary
- distance-limited – access to open-water possible but limited by longer travel times between the ramp and open-water, for example due to long distances, or speed restrictions in the waterway – with, in some instances, depth also being a limitation but distance being considered as the main constraint
- infrastructure-limited – access limited by configuration or size or nature of the infrastructure, for example, a low bridge preventing navigation
- beach ramps
- no open-water access – access to open-water is not possible or practical, for example, a facility in a dam, or on the upstream side of a weir, barrage, or waterfall.

#### 4.1.3 Existing capacity

The existing boat ramp facilities have been assessed individually to quantify their “effective” lane capacity. This assessment is presented in Appendix B and summarised in Table 6.

Table 6 – Summary of existing/planned\* boat ramp effective capacity by access type, Livingstone – Rockhampton region

Facility accessibility and tidal availability at the ramp	# of facilities *	# facilities limited by		Actual # of lanes	Effective lanes
		Water-side infrastructure	Land-side infrastructure		
<b>Open-water access</b>					
All-tide	3	2	1	10	13
Near all-tide	0	0	0	0	0
Part-tide	1	1	0	1	0.5
<b>Subtotal</b>	<b>5</b>	<b>4</b>	<b>1</b>	<b>13</b>	<b>13.5</b>
<b>Depth-limited open-water access</b>					
All-tide	0	0	0	0	0
Near all-tide	1	0	1	4	4
Part-tide	3	2	1	3	1
<b>Subtotal</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>7</b>	<b>5</b>
<b>Distance-limited open-water access</b>					
All-tide	3	0	3	11	6
Near all-tide	0	0	0	0	0
Part-tide	1	1	0	1	0.5
<b>Subtotal</b>	<b>4</b>	<b>1</b>	<b>3</b>	<b>12</b>	<b>6.5</b>
<b>Infrastructure-limited open-water access</b>					
	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Beach ramps</b>					
	<b>3</b>	<b>3</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>No open-water access</b>					
	<b>4</b>	<b>4</b>	<b>0</b>	<b>4</b>	<b>3.8</b>
<b>Total</b>	<b>19</b>	<b>13</b>	<b>6</b>	<b>38</b>	<b>30.8</b>

\*Includes MIIP announced projects/upgrades as at December 2016 including Robert Clark Drive, Callaghan Park, North Rockhampton, which was under construction at the time of writing (October 2017).

TMR's Marine Infrastructure Investment Program (MIIP) – at December 2016 – sets out the infrastructure planned and funded for implementation until the end of the 2017-18 financial year, and includes the government's Marine Infrastructure Fund capital projects. The only project scheduled for implementation in the Livingstone – Rockhampton region under the MIIP that seeks to increase the capacity of marine infrastructure is a new 4-lane boat ramp and associated parking at Robert Clark Drive, Callaghan Park in North Rockhampton, which was under construction at the time of writing (October 2017). Other planned works seek to upgrade existing facilities without increasing capacity.

This new facility is included in the “effective” capacity in Appendix B and Table 6.

Key observations drawn from this analysis include:

- There are fewer facilities that provide access to open-water in the region than those that provide access into estuaries or tidal river/creek systems.
- There are three freshwater facilities.
- Capacity at 13 facilities appears to be constrained by the availability of water-side infrastructure at the site, but parking is unformed or unmarked at seven of those facilities.
- There are 38 actual lanes but only 30.8 effective lanes at present, reflecting limitations imposed by tidal restrictions and the lack of adequate parking. This is most evident for facilities that provide distance-limited open-water access, where there are currently 12 actual lanes but only 6.5 effective lanes.
- The MIIP (as at December 2016) provides four effective lanes of additional capacity through the construction of a new facility in North Rockhampton (under construction at time of writing).

## 4.2 Landing capacity for deep-draught vessels

The function of most landings is to provide short-term shore access for deep-draught vessels to facilitate the transfer of passengers, provisions, or to make short excursions to the shore via tender dinghy. Landings may be located on the coast or in navigable river systems within the region, but are of little use unless sheltered from on-shore winds and wave action.

For this study, landings include jetty and pontoon structures that facilitate direct berthing of non-trailable vessels (keel boats and >8.0m powerboats), transient vessels, and/or tenders from larger vessels (where effective anchoring, berthing, or mooring is available nearby).

### 4.2.1 Capacity evaluation

The measurement of the recreational capacity of a landing is complex, as it is affected by:

- exposure of the landing to wind and wave conditions
- size and condition of the landing
- tidal availability
- the length of stay permitted
- enforcement practices
- competition from non-recreational boating users (such as authorised commercial users).

To accommodate these factors, landing capacity has been considered in the context of each landing's:

- contribution to a network of public landings throughout the region, and within a day's sail of a landing outside the region

- proximity to existing private/commercial recreational boat landings that accommodate visitors (such as those provided by yacht clubs)
- ability to service key destinations, such as access to basic provisions, key population areas or recreational destinations
- proximity to existing anchorage or mooring areas
- anecdotal usage.

#### 4.2.2 Existing capacity – deep-draught vessel landings

Within the Livingstone – Rockhampton region, there are four public landings that can be accessed by larger and deeper-draught vessels for short-term stays (a couple of hours or less), as detailed in section 3.1.

Key observations indicate that the three public jetties located in Rosslyn Bay Boat Harbour are used by commercial vessels, visiting recreational vessels, and occupants of the pile moorings in the harbour. Basic provisions and fuel are available from commercial retailers in the harbour, and access to public transport to Emu Park or Yeppoon is available nearby. Restaurants and other premises for social activities are situated in the adjacent private marina. As Rosslyn Bay is a state boat harbour, it is also a base for marine support such as the water police, Maritime Safety Queensland and volunteer rescue services.

The Derby Street jetty on the Fitzroy River receives recreational boating use, however a pontoon would be preferred by stakeholders as it is considered to be more functional to use over a wider range of water levels, and accessible by a greater proportion of the community. Town Reach of the Fitzroy River is a popular anchorage, and the jetty services this anchorage by providing access directly into the adjacent central business district of Rockhampton.

Although outside the scope of this study, there are two privately owned modern facilities within the region that also actively contribute to landing capacity. They are the Keppel Bay Marina, located in Rosslyn Bay Boat Harbour and services the marina (member and visitor sections) and vessels on moorings, and the Fitzroy Motor Boat Club, located in the Fitzroy River in Rockhampton, approximately 500m downstream of the Derby Street jetty, servicing members and the adjacent anchorage.

The effective capacity of landings servicing the region is summarised in Table 7.

Table 7 – Existing landing capacity, Livingstone – Rockhampton region

Evaluation category	Existing effective capacity
# of public sheltered mainland landings	4
# of public island landings – supplies available	0
# major private landings	2
<b>Total</b>	<b>6</b>
<b>Facilities not contributing to recreational capacity:</b>	
# of public unsheltered mainland landings	0
# of public island landings – no supplies available	0

## 5. Demand assessment

The assessment of demand for recreational boating facilities has been evaluated by Economic Associates (2016)<sup>7</sup> in terms of facilities for launching and retrieval of vessels (that is, boat ramps), and landings for short-term stays (generally less than a couple of hours). The demand for:

- boat ramps is driven by trailable vessels that can access the ramp
- landing facilities is focussed on providing a network of short term landings that service key land-side destinations (such as shops) of relevance or attraction to the boating community, with a particular focus on larger (non-trailable) vessels.

### 5.1 Boat ramp demand

The demand for boat ramps has been quantified using vessel registrations as the key indicator. The vessel registrations have been converted to an effective lane demand based on a typical boat ramp lane being able to accommodate 40 launch/retrieval manoeuvres per day. As discussed in Section 4.1.1, this figure has been determined using the relevant Australian Standard and previous studies as summarised by Economic Associates (2011)<sup>8</sup>.

The following section details the assessment of vessel registrations taking into consideration where vessels are likely to be used relative to where they are registered, and the demographics of the local area.

#### 5.1.1 Registration distribution

People using the boat ramp facilities at a particular location are attracted to that facility by several factors, including:

- proximity to home
- road access (sealing, quality and distance)
- proximity to vessel destination (reef, open water, islands, creeks, estuary, fishing grounds, skiing areas, and so on)
- quality of the experience and ease of use (launching/retrieval, parking, security, complementary facilities, and so on).

This means that at many locations and at various times, ramp users will travel out of the LGA in which their vessel is registered to use boat ramp facilities in a different LGA. In some locations, demand is driven by ramp users from outside of the LGA, particularly if the ramp is in reasonable proximity to desirable boating destinations such as fishing grounds or popular islands.

To further define the likely distribution of boat ramp users, including where ramp users were travelling from and to, consultation was undertaken with facility managers such as councils, and port and waterway authorities. Information provided by other key stakeholders was also considered. Livingstone Shire Council and Rockhampton Regional Council were both consulted to refine the demand import and export between LGAs as represented in Table 8, and to take into account anecdotal accounts from council officers of boat ramp usage on a facility by facility basis where possible.

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<sup>7</sup> Economic Associates (2016), Recreational Boating Facilities Demand Forecasting Study 2016

<sup>8</sup> Economic Associates (2011), Recreational Boating Facilities Demand Forecasting Study: Demand Analysis

Additional detail on the determination of the registration distribution is provided in Appendix C. Note that vessel registrations are less in inland LGAs compared to adjacent coastal LGAs.

A summary of the relative geographic contribution of demand on boat ramp facilities located in the Livingstone – Rockhampton region is shown in Table 8 for 2016 registration data.

### 5.1.2 Registration activation

TMR's approach to the provision of infrastructure for recreational boating is to aim to satisfy average demand rather than peak demand (TMR, 2016)<sup>9</sup>.

TMR recognises three levels of demand:

- off-peak demand – to be met in almost all circumstances
- average demand – taken to be demand for a facility on weekends (and for certain regional locations other busy periods)
- peak demand – being demand for a facility at peak holiday periods and for special events such as major fishing competitions.

The qualifier on certain regions and circumstances for average demand recognises that in some areas high numbers of shift workers tend to distribute the demand more evenly across each week.

The above definitions apply to “good-weather” days, i.e. fine weather with low winds. In regions where good weather is less common (particularly in terms of windy areas), average demand on these good weather days is higher than in areas where such conditions are more frequent. Average demand can therefore also be considered as demand for facilities on a good-weather, weekend day.

Provision is not generally made by TMR for peak boating periods such as Christmas, Easter, school holidays, and long weekends. Some facilities, however, require customised approaches to these general guidelines. For facilities provided by them, councils and port/water authority managers may choose to cater for higher than average demand.

Research referenced in the previous demand assessment study (GHD, 2011)<sup>10</sup> indicated that average to high demand was represented by 8% to 14% of registered vessels seeking to use a boat ramp on a typical weekend. This percentage has been termed as “registration activation” for the purposes of this study.

To better represent the demand from each local government area, refinement of the registration activation percentage considered the following factors as influencing boating popularity over other recreational opportunities:

- incidence of blue collar employment (based on Census data)
- average age of residents (based on Census data)
- remoteness classification by local government area
- whether the contributing LGA is coastal.

The registration activation percentage was further refined during the consultation process to determine if the activation rate reflected “on the ground” experiences.

Detail on the process for local refinement of registration activation is provided in Appendix C. The adopted parameters for this assessment are summarised in Table 8.

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<sup>9</sup> TMR (2016) Marine Facilities and Infrastructure Plan

<sup>10</sup> GHD (2011) Recreational Boating Facilities Demand Forecasting Study. Report prepared for TMR, September.

For the Livingstone – Rockhampton regional area, key observations relevant to the registration activation include:

- a high incidence of blue collar workers throughout the region compared to the state average
- a high incidence of older residents in Livingstone Shire compared to the state average
- classification of Livingstone Shire as “very remote” under the Accessibility/Remoteness Index of Australia
- designation of Rockhampton Regional LGA as a regional centre.

Table 8 – Contribution to demand for boat ramp facilities, Livingstone – Rockhampton region

Contributing LGA	% of contributing LGA using Livingstone – Rockhampton region facilities*	# of registered vessels from contributing LGA using Livingstone – Rockhampton region facilities	% registration activation	Contribution comment
Livingstone	98%	4,241	14%	Resident population Older, blue collar, very remote, coastal
Rockhampton	99%	5,129	10%	Resident population Blue collar, regional centre, coastal
Gladstone	4%	303	10%	Visitation from adjacent coastal LGA Blue collar, regional centre, coastal
Central Highlands	36%	802	10%	Hinterland catchment Blue collar, remote, non-coastal
Banana	10%	130	10%	Hinterland catchment Blue collar, remote, non-coastal
Isaac	5%	100	12%	Visitation from adjacent coastal LGA Blue collar, remote, coastal
Interstate	8%	61	-	-

\*See *Economic Associates Appendix C* for percentage estimates

Key observations regarding boat ramp demand relevant to the contributions from the various sources are:

- Population areas within the region are largely concentrated around Rockhampton and in the Yeppoon – Emu Park coastal area. Most Livingstone (98%) and Rockhampton (99%) residents are considered to use facilities within the region. The remainder are considered to use largely fresh water facilities in Gladstone and Isaac LGAs.
- Demand for tidal facilities from Banana and Central Highlands Regional Councils is funnelled through to the region by virtue of the road network (Capricorn Highway).

- Port Alma is located on the boundary between Rockhampton and Gladstone LGAs. Due to its isolated location and the general lack of road access to the coast north of Gladstone, the small demand contribution to the region from Gladstone LGA is expected to be specifically directed to this ramp.

In addition to usage of the Livingstone – Rockhampton region facilities by residents of the area and adjacent LGAs, the Yeppoon area is projected to experience an uplift in boating infrastructure demand as a result of tourism activity. Some of this increased boating tourism will be commercial, some will be incurred by residents taking visiting friends and relatives out on their boats, and other demand will be from general boating visitation.

Economic Associates (Appendix C) assumed that Livingstone Shire would experience an annual 10% uplift in boat ramp lane demand throughout the year as a result of tourism activity.

### 5.1.3 Demand classifications

The demand by registered vessels has been sub-classified to better align with differing types of destinations:

- Smaller vessels (less than 4.5m in length) are considered to be generally used to access protected waters such as creeks and estuaries, and to venture into nearshore coastal waters during good weather conditions only.
- Larger vessels (between 4.5 and 8m in length) are considered to be generally used to access offshore waters, but seek protected waters during poor weather conditions. Depending on the location, some larger vessels are unable to use tidally restricted facilities in creeks and estuaries.

### 5.1.4 Boat ramp lane demand

Applying the registration distribution and activation factors to vessel registration data results in an effective quantitative demand for boat ramp lanes within the catchment. This is summarised in Table 9, and shown in terms of small and large vessel demand. Assumptions used in the projections for future growth in demand are provided by Economic Associates in Appendix C.

Table 9 – Boat ramp lane demand projections, Livingstone – Rockhampton region

Vessel length	Boat ramp lanes*				
	2016	2021	2026	2031	2036
0 to 4.5m	23	25	27	29	31
4.5 to 8m	10	11	12	13	14
<b>Total</b>	<b>33</b>	<b>36</b>	<b>39</b>	<b>42</b>	<b>45</b>

\*Boat ramp lanes are reported to the nearest whole number.

Key observations relevant to the catchment demand include:

- The vast majority of demand on facilities originates from Livingstone Shire Council and Rockhampton Regional Council residents.
- Demand from small boats (<4.5m) is over twice that of larger boats (4.5m up to 8m).
- Growth is forecast to be relatively consistent over the next 20 years.



## 5.2 Deep-draught vessel landing demand

### 5.2.1 Local usage and network

Along with private marina facilities, the Rosslyn Bay jetties and Derby Street jetty in Rockhampton form part of a network of mainland landings accessible by deep-draught vessels cruising the Queensland coast. Approaching from the south, it is approximately 60 nautical miles from the public landing in Gladstone to Rosslyn Bay via the ocean-side of Curtis Island, as access for deep-draught vessels is not advisable through The Narrows.

To the north, it is a further 175 nautical miles from Rosslyn Bay to Mackay. Depending on the weather conditions and seasonal trade winds, Gladstone is within a day's sail of Rosslyn Bay but Mackay is not, and many vessels seek shelter in Thirsty Sound at Stanage Bay. This lack of landings through the northern Livingstone, Isaac and southern Mackay LGAs is a direct result of the very large tidal range in this area combined with the local geography making the provision of all-tide, all-weather facilities historically very expensive and therefore generally unviable.

Away from the open coast, Rockhampton's Derby Street jetty is located more than 30 nautical miles upstream of the Fitzroy River mouth, and as such vessels using this facility specifically seek access to the city of Rockhampton. Rosslyn Bay is approximately 23 nautical miles north of the Fitzroy River mouth and depending on tides and seasonal trade winds, is within a day's sail of Rockhampton.

Given Yeppoon and the broader Capricorn Coast's status as a tourist destination in its own right, and Rockhampton's position well upstream in a river, visiting vessels tend to stay for more than one night, and therefore will need to seek an overnight protected berth or mooring. Commercial marina facilities cater to this demand, providing landing facilities for their members and for casual visitors. Moorings or berths are generally available at Keppel Bay Marina in Rosslyn Bay, while the anchorage in Town Reach in Rockhampton assists in catering for this demand.

While the jetties in Rosslyn Bay are used for commercial and recreational boating, a pontoon would make access more functional for smaller vessels over a wider range of tide levels. When the structures reach the end of their design life, consideration should be given to replacement of one of the jetties with a pontoon. Retention of at least one jetty at this location will be needed to maintain access to a facility that can cope with the berthing loads associated with larger commercial vessels. Stakeholders have not indicated that these jetties are overloaded in demand terms.

The Derby Street jetty is used occasionally by deep-draught vessels but more frequently by tenders associated with vessels anchored in the Fitzroy River. Recreational anglers also use the jetty, however most give priority to vessels during berthing operations. Stakeholders have not indicated that this jetty is overloaded in demand terms, but have expressed a desire for a more functional landing in the form of a pontoon to service the Rockhampton central business district, particularly for access by disabled persons.

Community stakeholders have indicated a desire for a short-term public landing at Stanage Bay to cater to the popular anchorage in Thirsty Sound, and improve access for vessels to provisions and other supplies. Providing a landing in the vicinity of the boat ramp would benefit the economic development of this small township, and could lead to sealing of the road from the Bruce Highway, a distance of approximately 100km, of which approximately 80km is currently unsealed. Such a landing may need to be part-tide considering the shallow seabed out from the boat ramp. The primary need (aside from trailer boat launching) is for dinghy access from vessels anchored offshore.

Proposals for a marina on an island in the Keppel Group have been suggested as part of other tourism development works. If such proposals are further developed, there may be an opportunity for a public landing to be incorporated into any private development.

### 5.2.2 Landing demand

The projected demand for deep-draught vessel landings within the Livingstone Shire and Rockhampton Regional Council areas was assessed by Economic Associates as being driven by the size of the non-trailable fleet and by rate of visitation by cruising coastal vessels. A key difficulty with this assessment is understanding how long each visit lasts. It was assumed that demand comprises 5% of the active non-trailable fleet seeking to access a landing. The assessment is shown in Table 10.

Table 10 – Landing demand projections, Livingstone – Rockhampton region

Evaluation category	Landings				
	2016	2021	2026	2031	2036
# of landings	6	7	7	8	8

## 6. Development needs and opportunities

The need for additional recreational boating infrastructure within the Livingstone – Rockhampton region has been identified by comparing the existing capacity within the area against the expected demand.

### 6.1 Evaluation of needs

#### 6.1.1 Development priorities

The priorities for development are linked to need and funding cycles, as follows:

- Priority 1 (P1) These sites are needed to meet existing demand.
- Priority 2 (P2) Assuming that the priority 1 sites are implemented, these sites are expected to be needed to meet additional demand over the five years ending 2021.
- Priority 3 (P3) Assuming that the priority 1 and 2 sites are implemented, these sites are expected to be needed to meet additional demand over the subsequent five years, that is 2021 to 2026.
- Priority 4 (P4) These sites are those that will meet future demand, but are not expected to be required before 2026 in demand terms but may be brought forward for construction for other reasons.

#### 6.1.2 Quantification of shortfall – boat ramp lanes

The overall demand for boat ramp lanes in the broader Livingstone – Rockhampton region compared to the effective capacity provided by existing facilities is summarised in Table 11.

However, the provision of additional boat ramp lanes needs to cater to the type of demand to appropriately address that demand. This realistically translates to:

- large (that is 4.5 to 8m) vessels seeking access to open-water
- small (that is <4.5m) vessels not seeking access to open-water.

Table 11 – Projected boat ramp lane shortfall, Livingstone – Rockhampton region

Evaluation category	Existing effective capacity*	2016		2021		2026		2036	
		Demand	Shortfall	Demand	Shortfall	Demand	Shortfall	Demand	Shortfall
All vessels, all facilities	30.8	33.5	2.7	35.8	5.0	38.6	7.8	44.9	14.1

\*Existing effective capacity incorporates MIIP announced projects/upgrades as at December 2016, including Robert Clark Drive, Callaghan Park, North Rockhampton, which was under construction at the time of writing

As there will be some small vessels seeking access to open-water, and some larger vessels not seeking access to open-water, an envelope of projected need has been developed. For this assessment the Study has estimated that larger vessels will seek open water between 90% and 100% of the time, given the shallow nature of most non-open water destinations within the Livingstone – Rockhampton region. The Study acknowledges that some larger vessels are routinely used in estuaries, and in some cases to improve safety against crocodile attack.

The estimated demand for open-water facilities by smaller vessels is between 30% and 50% of on-water time, as demand is limited by “good-weather” days. For the remainder of the time these smaller vessels are accessing non-open-water areas such as estuaries and fresh water waterways.

The best estimate represents the average need within the envelope.

The analysis is shown in Table 12 for facilities classified as providing unhindered open-water access from all-tide or near all-tide facilities, with the envelope of projected need in the Livingstone – Rockhampton region based on the following:

upper bound = 100% larger vessels + 50% smaller vessels

lower bound = 90% larger vessels + 30% smaller vessels

Table 12 – Projected boat ramp lane shortfall, open-water access facilities, Livingstone – Rockhampton region

Evaluation category	Existing effective capacity	2016		2021		2026		2036	
		Demand *	Shortfall	Demand	Shortfall	Demand	Shortfall	Demand	Shortfall
<b>Best estimate</b>	<b>13</b>	19.2	6.2	20.5	7.5	22.1	9.1	25.7	12.7
Upper bound	13	22	9	23.5	10.5	25.3	12.3	29.5	16.5
Lower bound	13	16.3	3.3	17.5	4.5	18.8	5.8	21.9	8.9

\*Example of demand calculation: Upper bound 2021 – 100% of larger vessels (Table 9) + 50% of smaller vessels (Table 9) = 11 + 12.5 = 23.5

The analysis was also conducted for facilities classified as not providing open-water access, or where water depth or the on-water travel time meant that the facility could not reliably or realistically provide access to open-water (see Table 13). In this analysis, the envelope of projected need in the region is based on:

upper bound = 70% smaller vessels + 10% larger vessels

lower bound = 50% smaller vessels + 0% larger vessels

There are some facilities that have been calculated as a “non-open-water access” facility that can, under some circumstances, provide open-water access. However, for the majority of users, access into the local waterway is the primary destination. This also applies to “open-water access” facilities in waterways, where some users will stay within the estuary rather than going offshore.

Table 13 – Projected boat ramp lane shortfall, non-open-water access facilities, Livingstone – Rockhampton region

Evaluation category	Existing effective capacity*	2016		2021		2026		2036	
		Demand	Shortfall	Demand	Shortfall	Demand	Shortfall	Demand	Shortfall
<b>Best estimate</b>	<b>17.8</b>	14.3	-3.5	15.3	-2.5	16.5	-1.3	19.2	1.4
Upper bound	17.8	17.2	-0.6	18.3	0.5	19.8	2.0	23.0	5.2
Lower bound	17.8	11.5	-6.3	12.3	-5.5	13.3	-4.5	15.4	-2.4

*\*Existing effective capacity incorporates MIIP announced projects/upgrades as at December 2016, including Robert Clark Drive, Callaghan Park, North Rockhampton, which was under construction at the time of writing*

The assessment indicates that access to non-open-water is currently well catered for, and the existing facilities are sufficient to meet demand for this type of access over the next 10 years.

Given that the majority of demand for recreational boating facilities is driven by Livingstone Shire Council and Rockhampton Regional Council residents, the location of additional or upgraded facilities should be targeted to service the main population centres of:

- Capricorn Coast (Yeppoon/Emu Park area)
- Rockhampton

The Fitzroy River delta, including the waterways connected to Port Alma, is recognised as an increasingly popular fishing destination, and is being actively promoted as such by Rockhampton Regional Council since the declaration of net-free fishing zones.

Regional areas and smaller communities elsewhere in the Rockhampton – Livingstone region are adequately serviced by existing local facilities. The Study notes that MIIP upgrades to several of these regional facilities are either in progress or planned.

### 6.1.3 Quantification of shortfall – deep-draught vessel landings

The assessment of shortfall in landings is shown in Table 14. This assessment indicates that at present the public network in conjunction with the supplementary capacity provided by commercial or club landings is adequate to cater for existing demand, however an additional two landings will be required in the future. These will likely be pontoons, as jetties are no longer preferred by users.

Table 14 – Projected landing shortfall, Livingstone – Rockhampton region

Evaluation category	Existing effective capacity*	2016		2021		2026		2036	
		Demand	Shortfall	Demand	Shortfall	Demand	Shortfall	Demand	Shortfall
# of landings*	6	6	0	7	1	7	1	8	2

\*# of landings consists of public sheltered mainland landings, public island landings – supplies available and major private landings

## 6.2 Identified stakeholder opportunities

Table 15 summarises the key facilities and sites identified by stakeholders during consultation activities as requiring consideration.

Table 15 – Stakeholder identified opportunities to increase capacity, Livingstone – Rockhampton region

Facility	Stakeholder comments	Study comments
Coorooman Creek (Livingstone Shire)	Popular, well-used facility. Estuarine access. Open-water access limited by depth and mobile sand bars at creek mouth.	Facility upgrade completed June 2017. Further upgrade to facility not currently recommended.
Corbetts Landing (Livingstone Shire)	Well-used facility. Estuarine access. Open-water access limited by depth. Upgrade to ramp to reduce silt build up desirable.	Upgrade of facility to a near all-tide or all-tide, 2-lane ramp and the formalisation of parking for 45 CTU spaces is recommended.
Stanage Bay (Livingstone Shire)	Beach ramp. Well-used facility. Fair open-water access. Options for parking expansion. Protection from tidal currents, wind and wave action desirable. Landing for cruising deep-draught vessels desirable.	No other facilities are within a one-hour drive time. Closest boat ramp is at St Lawrence in Isaac Regional Council, nearly four hours drive. Extension of existing ramp to improve tidal access, protected by a rock breakwater, and a floating walkway as a ramp queuing facility/tender landing are recommended.

Facility	Stakeholder comments	Study comments
<p>Rosslyn Bay (Livingstone Shire)</p>	<p>Highly-popular, well-used facility. Excellent open-water access. Parking expansion desirable. Extreme low tide access improvement desirable. Current throughput at ramps considered inadequate.</p>	<p>Expansion of parking capacity is recommended. Vacant land is available immediately north of the service station. Additional ramp lanes and/or floating walkways adjacent to the current ramps could be provided by reconfiguring the ramp layout. After the parking expansion identified above is completed, there is no space for further parking expansion without encroaching into national park. Further expansion of the harbour by reclamation and dredging seaward could accommodate additional CTU parking and additional ramp lanes. Increasing capacity at Rosslyn Bay does not resolve traffic issues or address the community desire to spread facilities more evenly along the coast. However, a moderate increase may form an affordable part of a multi-site staged increase in all-tide sheltered launching capacity on the Capricorn Coast. Any upgrade within the existing harbour footprint aimed at improving amenity for boaties or on-water congestion should be considered on the basis that, while short-term congestion would be lessened, overall throughput would not be increased. Expansion of the harbour outside the current footprint is recommended as an option for further consideration.</p>
<p>Causeway Lake (Livingstone Shire)</p>	<p>Accretion on seaward side of causeway. Lake is becoming shallower as sediment is not able to be effectively flushed. Possibility for major works to improve flushing and create new opportunity for harbour-scale development.</p>	<p>Consideration of a new major boating facility within a man-made harbour, consisting of at least a 4-lane ramp with a floating walkway and 90 CTU spaces, is recommended.</p>

Facility	Stakeholder comments	Study comments
Taylor Street, Keppel Sands (Livingstone Shire)	<p>Beach ramp.</p> <p>Poor open-water access.</p> <p>Exposed to wave action at higher tides.</p> <p>Improved open-water access is desirable.</p> <p>Beach access ramp to provide alternative access desirable.</p>	<p>Ramp is for local/holiday use only. Coastal exposure of site would necessitate safe harbour scale development to provide suitable protection from wave action.</p> <p>Addition of beach ramp in more sheltered position possible to improve safety at higher tides but does not improve capacity of facility.</p> <p>Sheltered near all-tide, open-water access provided at Coorooman Creek or sheltered all-tide open-water access provided at Rosslyn Bay, which are both within one-hour driving time.</p> <p>Upgrade to facility not currently recommended.</p> <p>Coastguard could consider relocating to Coorooman Creek to provide a better service than from the two Keppel Sands facilities.</p>
Nerimbera (Livingstone Shire)	<p>Distance-limited open-water access.</p> <p>Estuarine access to the Fitzroy River.</p> <p>Parking is currently informal and small compared to water-side infrastructure.</p> <p>Formalisation and expansion of parking is desirable.</p>	<p>Formalisation of parking area to achieve at least 70 CTU spaces and sealing of the access road is desirable.</p> <p>Upgrade to in-water component of facility not currently recommended.</p> <p>The facility services both Rockhampton and Livingstone boaties.</p>
Larcombe Street, Rockhampton (Rockhampton Regional)	<p>Fresh water access.</p> <p>Widening of ramp desirable.</p> <p>Floating infrastructure desirable.</p> <p>Formalisation of parking desirable.</p>	<p>Formalisation of parking would not improve the facility capacity as informal parking is currently used efficiently.</p> <p>Widening of the ramp, while potentially improving the usability of the ramp, will not increase the facility capacity.</p> <p>Floating infrastructure would require a feasibility study due to the flood prone nature of the Fitzroy River.</p> <p>Upgrade to facility not currently recommended.</p>

Facility	Stakeholder comments	Study comments
Ski Gardens, Rockhampton (Rockhampton Regional)	Fresh water access. Upgrade of facility desirable. Floating infrastructure desirable. Formalisation of parking desirable.	Floating infrastructure would require a feasibility study due to the flood prone nature of the Fitzroy River and variable water levels. Facility is currently used efficiently. Expansion of facility ramps and parking would be required to increase the capacity of the facility. A rebuild of the existing boat ramp was completed in September 2017. Further upgrade not currently recommended.
Port Alma (Rockhampton Regional)	Well-used facility. Excellent open-water and estuary access. Floating walkway desirable. Needs relocation due to proximity to hazardous port operations (explosives).	A new, relocated facility consisting of a 4-lane ramp with a floating walkway and 90 CTU spaces is recommended to replace the existing 2-lane ramp. Reclamation will be required to achieve this. Site E is nominated as the preferred location (see below).

### 6.3 Other open-water access locations considered

The assessment undertaken for the Rockhampton – Livingstone region clearly indicates an existing unmet need for additional facilities that provide access to open-water.

Of particular relevance for the south Capricorn Coast was a Community Engagement Report completed by the former (pre-de-amalgamation) Rockhampton Regional Council (2012)<sup>11</sup>, which at the time comprised the current Rockhampton and Livingstone LGAs. That report outlined seven possible locations to expand or construct new recreational boat launching facilities from a land-side perspective. These seven locations were considered by Rockhampton Regional Council, subject to a supplementary study by TMR from a marine perspective, as having potential to provide capacity to meet open-water demand along the southern Capricorn Coast.

TMR subsequently confirmed two sites at Emu Park for investigation, and duly conducted hydrographic survey, configuration options, costings, and a community impact study. The options, costings, and community impact study results/recommendations were referred to government and resulted in a decision to not proceed with a new boat ramp at Emu Park.

<sup>11</sup> Rockhampton Regional Council (2012), South Capricorn Coast Boat Ramp Community Engagement Report/Survey Report



Due to the lack of naturally occurring deep-water protected sites along the Capricorn Coast, all new or expanded options/locations will require dredging and/or sheltering from wave action to provide all-tide, all-weather access to open-water. As significant environmental disturbance is expected at such new sites and works within the marine park are inevitable, approvals agencies will – on the basis of past experience – seek confirmation that existing facilities on already disturbed sites have been utilised to their full potential before new (greenfield) sites are sanctioned. This creates an imperative for TMR (as harbour owner/manager) to maximise parking capacity and reduce boat ramp congestion inside Rosslyn Bay Boat Harbour. Such action will pave the way for consideration of new/greenfield sites on the Capricorn Coast.

Due to the significant capital cost involved in establishing new all-tide, all-weather facilities on the open coast, the Study recommendations assume minimum provision of at least a 4-lane boat ramp at any/all new sites. The Study notes that, due to a lack of car parking space, the Emu Park options were for a 2-lane ramp.

### 6.3.1 Fig Tree Creek

The existing 1-lane boat ramp at Fig Tree Creek provides part-tide, open-water access via Ross Creek close to the heart of Yeppoon. Shallow depths at low tide limit navigable access to the boat ramp (see sandbank extent in Figure 1). Inside the creek the channel is marked to indicate the best naturally occurring water.



Maintenance dredging of a navigable channel at this site would improve usage of this facility. In this area the dominant longshore sediment transport direction is from north to south. A northern creek training wall, or a groyne on the beach close to the northern bank of Ross Creek mouth, would intercept south-travelling beach sediments before they interfere with navigation, and improve the longevity of any dredging works.

Landside expansion of this facility is limited by the proximity of the Scenic Highway and the waterway. The site is a reserve (Anderson Park) currently occupied by a tourist information centre and parkland, and is routinely used for community markets. There is sufficient room for parking expansion/shared usage. However, this would result in loss of the existing low-key recreational use. Upgraded access between the facility and Scenic Highway could be provided directly from the roundabout at the western end of the site.



- Provide additional floating walkways to service outer ramp lanes on both ramps, possibly in conjunction with walkway relocation (above). Some ramp users exacerbate congestion by choosing to queue to access only the ramp lane adjacent to the floating walkway, rather than use other lanes.
- Provide a regular gangway-access pontoon near the Water Police facility to allow passenger collection/drop-off close to the northern parking area. The northern parking area is approximately 300m from the nearest ramp, and the time taken for CTU return/retrieval or waiting for passengers can impede efficient use of the floating walkway and contribute to on-water congestion.
- Expand CTU parking into the existing vacant land immediately north of the service station to maximise parking for the existing ramp lanes.
- Upgrade the Vin E Jones Memorial Drive/Scenic Highway intersection to assist in reducing road traffic congestion during peak periods.

Given the lack of available space for parking inside the harbour and lack of available foreshore for additional ramps, an option to increase capacity is expansion of the harbour northward through breakwater extension and land reclamation.

While works to expand the boat harbour would be significant, it would be comparable to the establishment of a greenfield protected all-tide facility, with the benefit of existing infrastructure and commercial development. Since Rosslyn Bay Boat Harbour is the only genuine all-tide, all-weather facility on the Capricorn Coast, further disturbance of, or adjacent to, this site may be viewed more favourably by approvals agencies compared to disturbance of a greenfield site. As such, this study includes expansion of Rosslyn Bay Boat Harbour as one long-term option for increasing all-tide protected boat launching capacity in the Rockhampton region.

Minimum works required: breakwater extension, new 4-lane boat ramp, floating walkway, cyclone wave-proof reclamation for car park, car park establishment, initial (capital) and maintenance dredging.

Estimated cost: \$19 million (to  $\pm 50\%$ )

This cost estimate allows for 10 years of maintenance dredging, noting that dredging would be an ongoing cost. The cost of maintenance dredging should be less than at other sites, as mobilisation costs would be included in the current Rosslyn Bay Boat Harbour maintenance dredging program.

### 6.3.3 North Kemp Beach

This site is located at the northern end of Kemp Beach, immediately east of Rosslyn Bay Boat Harbour. This area is currently an undeveloped, recreational, sandy beach, approximately 100m wide at low tide and backed by a well-vegetated dune system. A facility at this location would be accessible from Vin E Jones Memorial Drive. A breakwater to shelter a facility from easterly to southerly winds and waves would be required.

As outlined within the Community Engagement Report<sup>11</sup>, placement of an additional boat launching facility in close proximity to the existing Rosslyn Bay Boat Harbour could leverage from existing infrastructure and services such as fuel supply and access roads, however would exacerbate traffic congestion at/near the harbour.



Figure 3 – North Kemp Beach (13 May 2016)

Access to Rosslyn Bay is via a single road entry/exit, which contributes to congestion on busy days, and there are limited opportunities to expand the parking availability due to geography of the north Kemp Beach area and the proximity of the adjoining national park. Additional parking would be required to gain benefit from a new boat ramp in this location. As there is insufficient land available in close proximity, the Study anticipates that reclamation of seabed would be required for parking.

The 2012 report<sup>11</sup> considered that expansion of the existing facilities at Rosslyn Bay would be more beneficial than constructing a new facility in such close proximity.

Minimum works required: cyclone wave-proof reclamation or causeway to reach navigable water, breakwater, new 4-lane boat ramp, floating walkway, reclamation for car park, car park establishment, initial and maintenance dredging.

Estimated cost: \$29 million (to ±50%)

This cost estimate allows for 10 years of maintenance dredging, noting that dredging would be an ongoing cost.

#### 6.3.4 South Kemp Beach

A facility was proposed adjacent to the existing amenities block at the recreational reserve at the southern end of Kemp Beach, within 2km of Rosslyn Bay. Road access to an existing car park is provided directly from the Scenic Highway.

While this option has the benefit of easy accessibility from a main arterial road, the well-vegetated recreational reserve adjoins the Bluff Point section of the Capricorn Coast National Park. Development of a facility in this location would impact on views and amenity for users of the National Park.

Significant clearing would be required to provide CTU parking to accompany the facility, and as the embayment is shallow, major infrastructure consisting of breakwaters, reclamation and/or dredging would be required to achieve and maintain all-tide access and sheltered facilities.

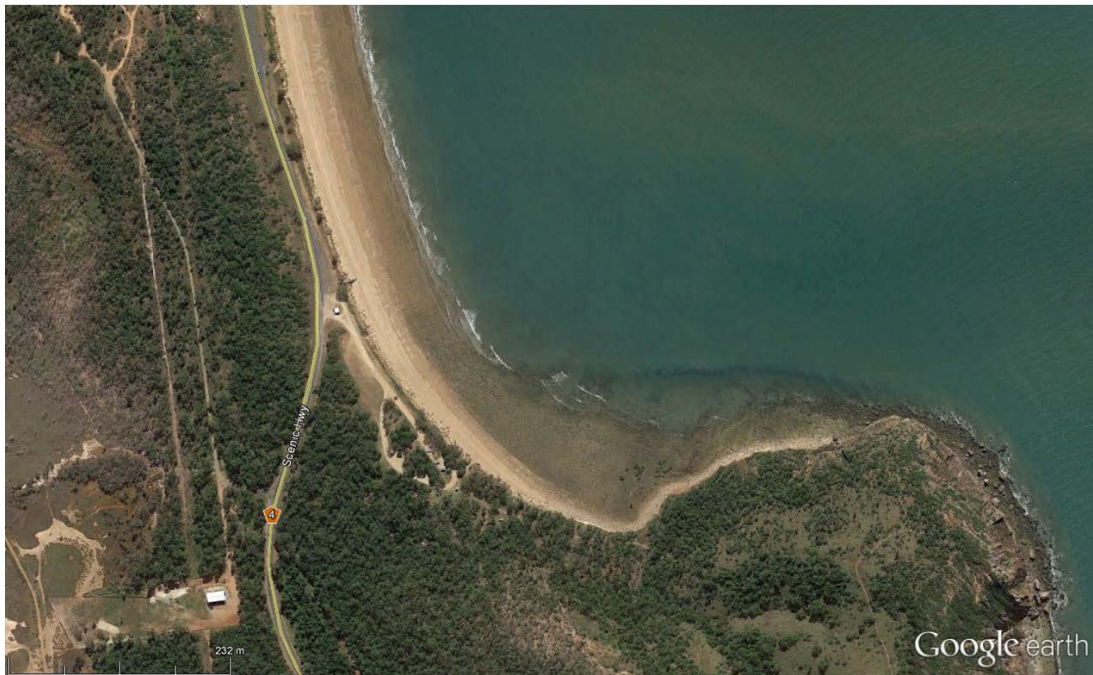


Figure 4 – South Kemp Beach (13 May 2016)

Depending on the facility configuration and dredging extent adopted, the distance between the boat ramp and the parking area could be up to 600m. Reclamation for CTU parking would likely be necessary for efficient use of the boat ramp if no capital dredging is required.

As options exist for the expansion of Rosslyn Bay as an already disturbed site, the 2012 report<sup>11</sup> did not support south Kemp Beach on environmental and financial grounds. This study supports that position.

Minimum works required: cyclone wave-proof reclamation or causeway to reach navigable water, breakwater, new 4-lane boat ramp, floating walkway, reclamation for car park, car park establishment, initial and maintenance dredging.

Estimated cost: \$27 million (to ±50%)

This cost estimate allows for 10 years of maintenance dredging, noting that dredging would be an ongoing cost.

#### 6.3.5 Causeway Lake

The former mouth of Mulambin Creek (also referred to as Shoal Creek) has been identified as a potential site for a new facility. A causeway and short bridge were constructed across the mouth of the creek in the 1930's to limit channel meandering and facilitate road construction between Yeppoon and Emu Park. A concrete platform under the bridge acts as a low level weir/barrage, maintaining a minimum water level in the lake but allowing seawater inflows on higher tides.

The construction of the causeway has had negative impacts on Kinka Beach to the south. By the 1970s, the channel meandering south close to the causeway combined with refraction from changed nearshore sand shoals had resulted in major beach erosion. Subsequent east-west realignment of the channel allowed infilling of the old creek channels and natural reinstatement of the dune, both of which are presently stabilised with vegetation. The channel continues to meander south but is now further east than previously. The area remains at risk from future erosion should the creek channel migrate further westward.

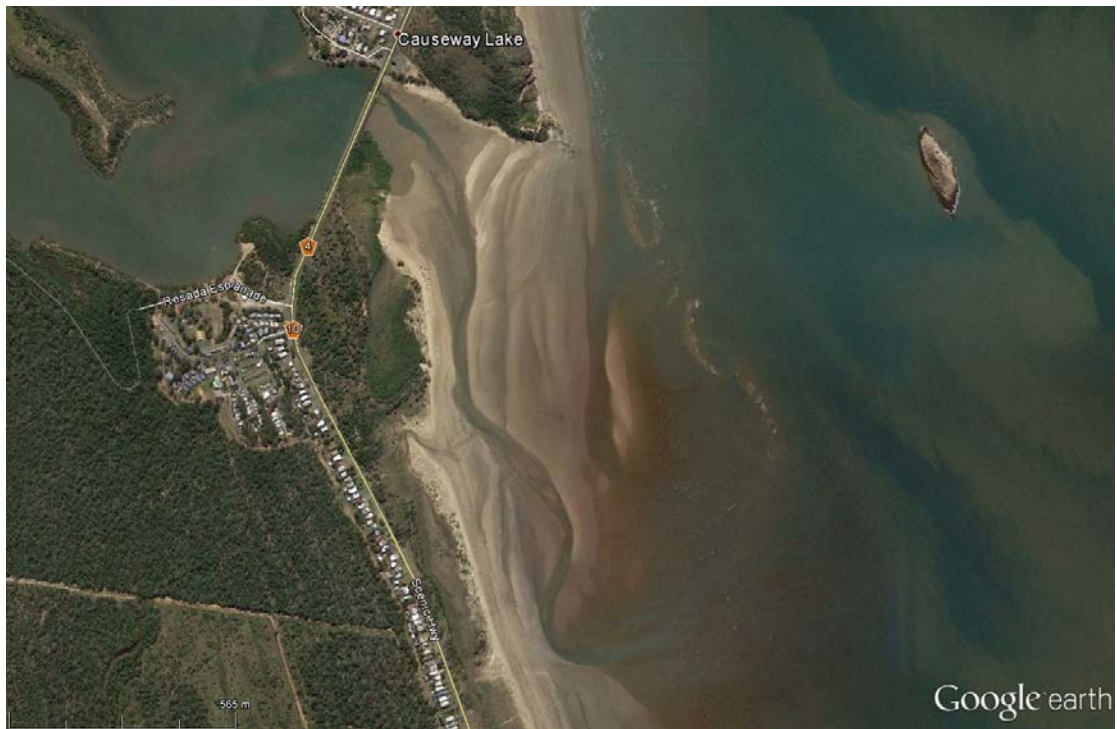


Figure 5 – Causeway Lake (13 May 2016)

Water quality in Causeway Lake has also been progressively deteriorating due to siltation and nutrient loads, and also due to the artificial environment created by the construction of the causeway. Routine dredging immediately downstream of the causeway would assist in reducing the flow of beach sands into the lake on high tides, as well as maintaining an east-west channel away from Kinka Beach. Such dredging could be extended to create a marina that also provides a sheltered site for boat launching and retrieval. Clean sands removed to construct and maintain these works would provide an ongoing supply of sediment to nourish Kinka Beach.

The nearshore area is shallow, and is largely protected from north-easterly waves by the headland at the southern end of Mulambin Beach, but is exposed to easterly and south-easterly waves. At low tide the exposed sand flat is more than 500m wide. Detailed site investigations would be required to confirm the suitability of the site for a significant boating facility, as suitable depths for navigational access are hundreds of metres offshore. Major reclamation to support harbour infrastructure assists reaching these depths. Combined public and private investment would likely be required for project viability. Monitoring of sediment transport past the facility and periodic beach nourishment of adjacent beaches with accumulated beach sands would likely be required.

The area is popular with beach goers who recreate in the lake and on the seashore. A facility in this location would service demand from the Emu Park area, and also is marginally closer than Rosslyn Bay Boat Harbour for Rockhampton residents. It is located adjacent to the popular off-shore destination of Great Keppel Island.

This site was not considered in the 2012 Community Engagement Report<sup>11</sup>.

Minimum works required: dredging, breakwaters, new 4-lane boat ramp, floating walkway, reclamation for car park, car park establishment, maintenance dredging, plus private sector funded marina works.

Estimated cost: \$126 million (to ±50%) (marina costs additional)

This cost estimate allows for 10 years of maintenance dredging, noting that dredging would be an ongoing cost. The estimate also assumes the use of clean dredge spoil to be utilised for a portion of the reclamation. The estimated cost includes an access road to the recreational boating facility.

### 6.3.6 Ritamada

A potential boat launching site has previously been proposed at Ritamada, on the headland north of Tanby Point. Access would be via Ritamada Road.

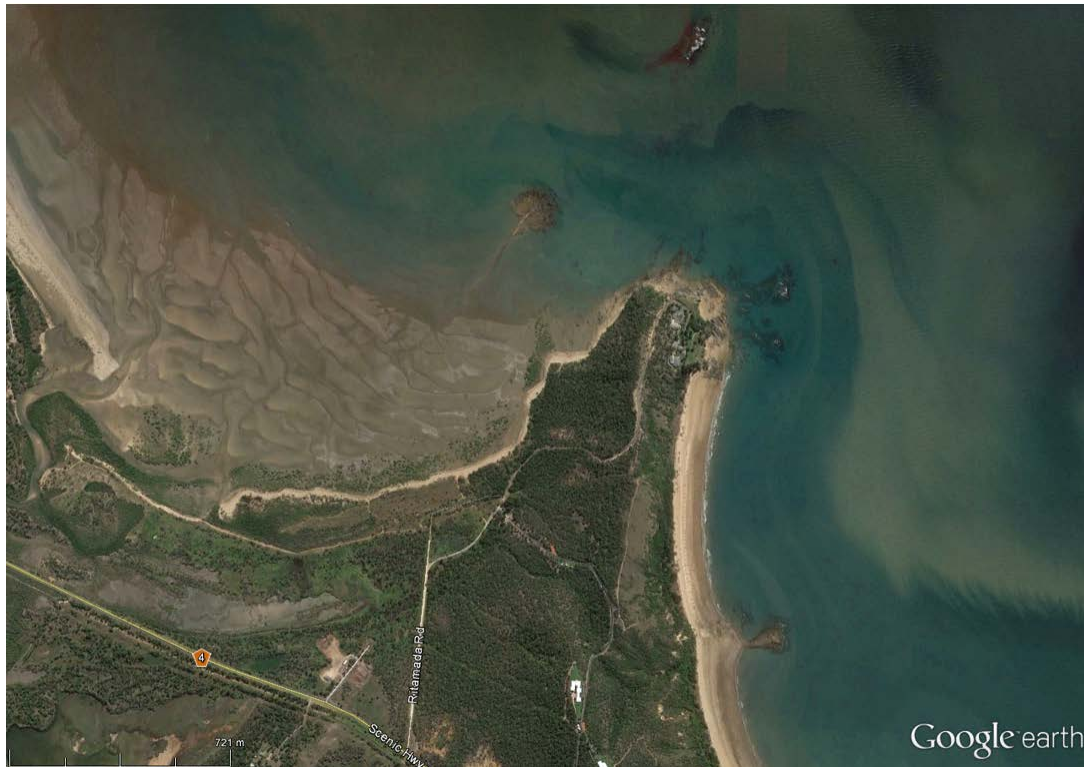


Figure 6 – Ritamada (13 May 2016)

The location identified in the Community Engagement Report<sup>11</sup> was for a facility at the northern end of the headland. However the headland is privately owned and is currently used by the Rockhampton Grammar School as an education facility. Significant infrastructure has been constructed on the north-eastern side of the headland.

Much of the remaining headland is steeply sloping and major clearing and/or earthworks would be required to provide flat areas suitable for CTU parking. To reduce impacts on existing infrastructure, locations were considered on the north-western side of the headland, however water depths in this area are minimal with significant inter-tidal flats exposed at low tides. The inter-tidal flats are approximately 500m wide adjacent to the existing publicly owned land at the end of Ritamada Road.

As establishing a facility in this location would be expected to require the purchase of freehold land, construction of a costly cyclone wave-proof foreshore road, earthworks or reclamation for the use of CTU parking, construction of breakwaters, and significant disturbance of the environment to achieve all-tide launching water depths, Ritamada was not considered a feasible option.

Minimum works required: cyclone wave-proof reclamation or causeway to reach navigable water, breakwater, new 4-lane boat ramp, floating walkway, car park preparation: clearing and earthworks or reclamation or dredging, car park establishment, maintenance dredging.

Estimated cost: \$36 million (to ±50%)

This cost estimate allows for 10 years of maintenance dredging, noting that dredging would be an ongoing cost. The estimate is based on reclamation for access and parking, and does not include land purchasing costs for an alternative configuration.

### 6.3.7 Fisherman's Beach (Emu Park)

An all-tide facility was considered at the southern end of Fisherman's Beach in Emu Park, with access provided from Hill Street. Concepts were proposed in various forms on both sides of Emu Point (the headland at the end of Hill St). All concepts involve major breakwaters/ protection works.

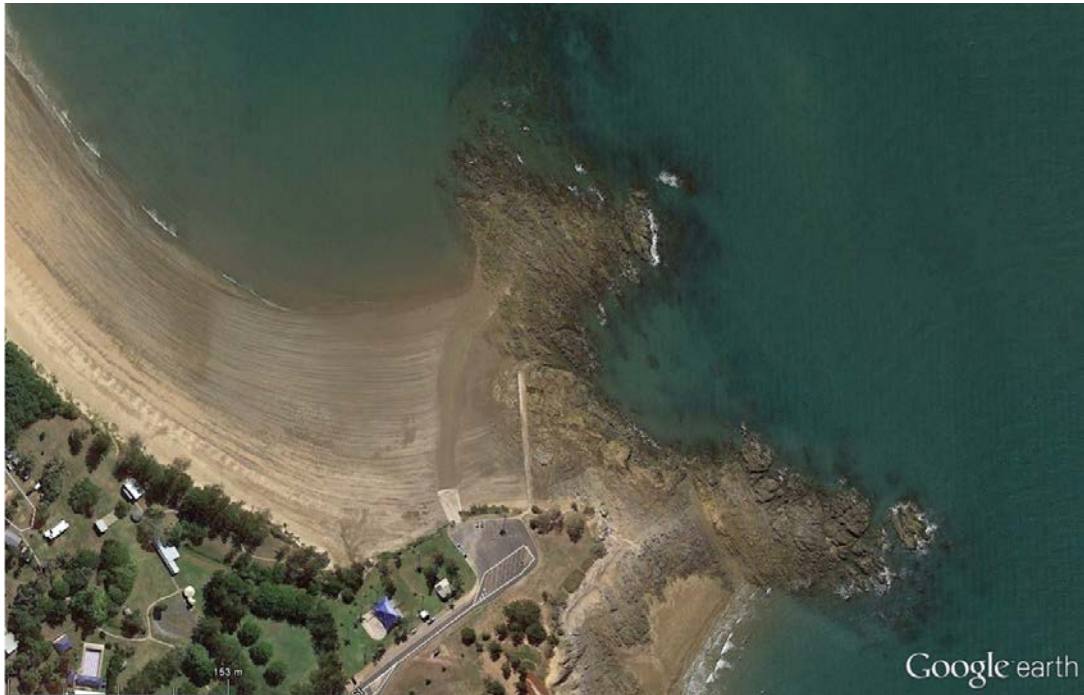


Figure 7 – Fisherman's Beach (13 May 2016)

This site was proposed by the community as providing an opportunity for a new all-tide protected launching facility on the Capricorn Coast<sup>11</sup>. A Social and Economic Benefits and Impacts Assessment<sup>12</sup> outlining two concept options for a facility at the site was prepared by TMR in September 2016. This analysis identified potential benefits and impacts for both options. Community groups expressed concerns with the facility location. Increased congestion through the township and impacts to community values, identity, character and amenity of the area were the greatest concerns.

Community consultation determined that the majority of Emu Park and Zilzie residents opposed a recreational boating facility at the proposed location.

Minimum works required: cyclone wave-proof reclamation or causeway to reach navigable water, breakwater, new 4-lane boat ramp, floating walkway, reclamation for car park, car park establishment, initial and maintenance dredging.

Estimated cost: \$15 million (to  $\pm 50\%$ ) (4-lane ramp plus parking for 90 CTU)

Estimated cost: \$8 million (to  $\pm 25\%$ ) (2-lane ramp plus parking for 45 CTU, as per TMR concepts)

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<sup>12</sup> GHD on behalf of the Department of Transport and Main Roads (2016), Capricorn Coast Boating Facility Feasibility Study: Social and Economic Benefits and Impacts Assessment



This cost estimate allows for 10 years of maintenance dredging, noting that dredging would be an ongoing cost.

### 6.3.8 Ladies Beach (Emu Park)

An option proposed at Ladies Beach, Emu Park, was a marina style facility accessed by either Hill Street or Granville Street. Given the relatively small size of the bay, it is likely that the development would consume the entire area between the headlands. The upper beach consists of small sand deposits between outcrops of the rock shelf, with sand deposits partially covering the rock shelf exposed at lower tide levels.



Figure 8 - Ladies Beach (13 May 2016)

As the site would be exposed to wind and waves from the north-east through to the south-east, any facility to provide all-tide access would require protection in the form of a breakwater or similar. The available public land to the west of the embayment is notably elevated compared to the beach levels, and contains popular parkland areas and the locally significant Singing Ship monument. Reclamation to accommodate CTU parking nearby would be required. Major dredging to reach navigable depths or provide a marina would also be necessary.

The Community Engagement Report<sup>11</sup> identified that the community preferred the adjacent Fisherman's Beach proposal over development of Ladies Beach.

Minimum works required: dredging, breakwaters, new 4-lane boat ramp, floating walkway, reclamation for car park, car park establishment, maintenance dredging.

Estimated cost: \$22 million (to ±50%)

This cost estimate allows for 10 years of maintenance dredging, noting that dredging would be an ongoing cost.

### 6.3.9 Shelly Beach

The area at the southern end of Shelly Beach was identified as a potential site for a boating facility due to the natural sheltering from southerly winds provided by Rocky Point. The site is exposed to northerly and easterly winds and waves, and substantial training structures would be required to shelter a boat ramp at this location. Sufficient depth for all-tide navigation is approximately 200m offshore, therefore a causeway or substantial reclamation would be required to reach this, resulting in localised loss of the recreational beach.

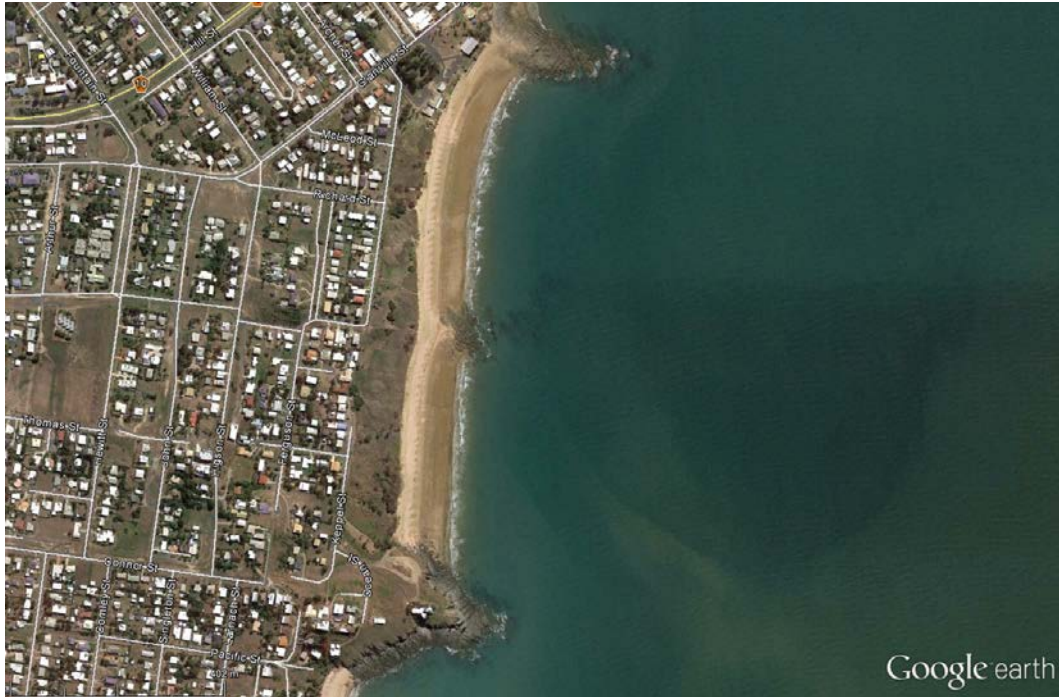


Figure 9 – Shelly Beach (13 May 2016)

The surrounding area is residential and road access to the site from Scenic Highway is currently disjointed. An upgrade of Connor St to provide through access would be required. Establishment of a facility in this location has the potential to introduce a significant volume of traffic into an existing residential area.

Land areas are elevated and steeply sloping to the west and south of the beach, with a wide and well-vegetated dune system in place. Flat areas suitable for parking would need to be incorporated into a reclamation, as the only available land areas for parking would be at least 300m from the ramp, which would be non-optimal, affect efficient use of the ramp, and would have notable aesthetic impacts on local residents.

Longshore sediment transport rates in this area are generally low and directed towards the south, however Rocky Point is exposed to waves from the north through east to the south. Orienting the mouth of a small craft facility to maximise wave sheltering and minimise siltation would require careful consideration. Failure to do so would result in either reduced functionality due to wave penetration or onerous maintenance dredging requirements.

LSC advised that this site was investigated as a preliminary site in the 2012 Council investigation into potential recreational boating sites on the Capricorn Coast. At that time, the site was not considered to be viable or to meet evaluation criteria. Key concerns raised were the long access route through residential areas, popularity of the beach with the local community, impacts on sediment transport and siltation, the need for road network linkages involving steep grades and the lack of available land other than foreshore land for the development.

As a result of these concerns, this site was not considered further in the 2012 Community Engagement Report<sup>11</sup>. In 2017 LSC reiterated that development of this site for a boating facility is not supported for the above reasons.

Minimum works required: cyclone wave-proof reclamation or causeway to reach navigable water, breakwater, new 4-lane boat ramp, floating walkway, reclamation for car park, car park establishment, initial and maintenance dredging.

Estimated cost: \$27 million (to ±50%)

This cost estimate allows for 10 years of maintenance dredging, noting that dredging would be an ongoing cost. The cost to upgrade the road network (Connor St) to improve access to the site has not been included.

#### 6.3.10 Coorooman Creek

The Coorooman Creek facility consists of a 4-lane boat ramp with a floating walkway supported by 93 CTU spaces. At the time of the 2012 council report the facility contained a 2-lane ramp without a floating walkway. It was proposed at that time that the existing facility be expanded and channel markers installed to improve safe access to open-water.

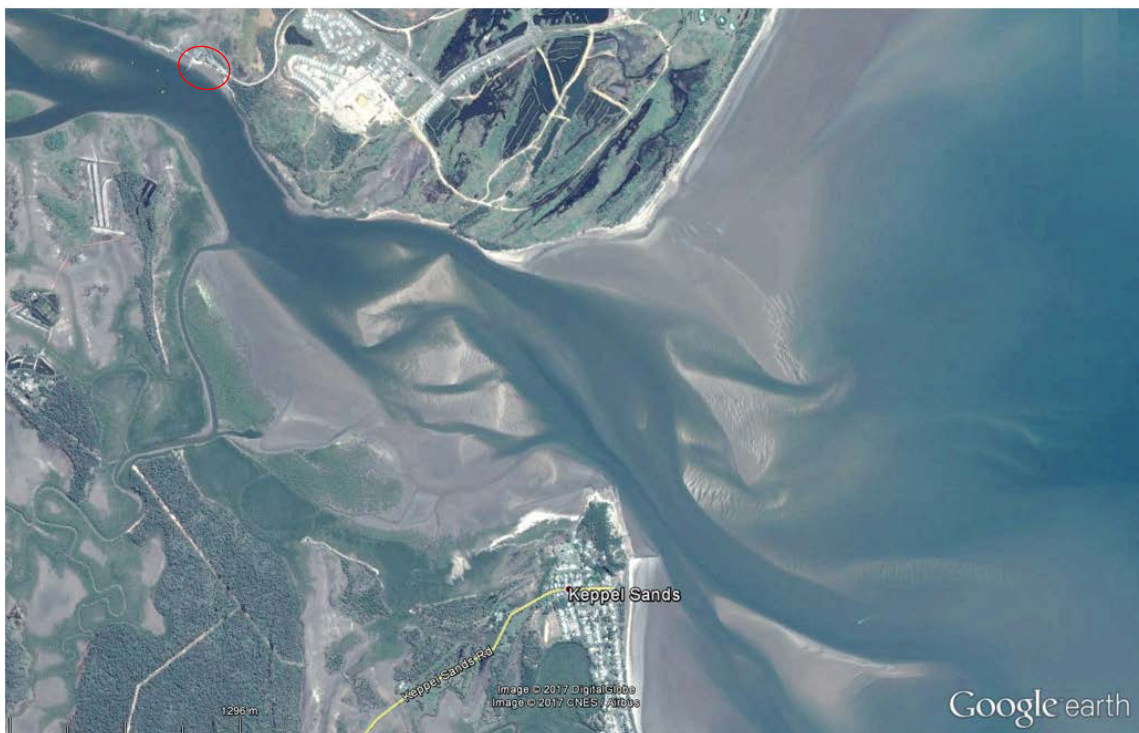


Figure 10 – Coorooman Creek (6 December 2013) (facility location circled)

Subsequent to the survey, the facility was expanded to include a floating walkway and then later an additional 2-lane boat ramp. Additional CTU parking was completed in 2017, although road access from Zilzie Beach is still unsealed at October 2017.

While there is room for additional infrastructure at this location, the reliability of open-water access at lower tide levels continues to be the main constraint for increasing capacity. Many users of this facility understand that navigation between the ramp and open-water is reliable at higher tides, and therefore plan their use of this facility to coincide with those times. At lower tides, mobile sand shoals and shallow channel depths affect consistent navigable access to open-water. For the purposes of this assessment, this site is considered to provide depth-limited open-water access and therefore is considered to not contribute significantly to satisfying demand for sheltered all-tide open-water access.

Creation of a dredged channel between the ramp and open-water has been suggested. This channel would need to be approximately 7km long, and depending on the mobility of the sand shoals would be expected to need frequent dredging to maintain.

An investigation into the viability of providing waypoints to guide navigation is ongoing. Further expansion of this site should only be considered if more reliable navigable access to open-water is maintained.

Minimum works required: additional 4-lane boat ramp, floating walkway, car park upgrade/expansion, capital and maintenance dredging.

Estimated cost: \$39 million (to  $\pm 50\%$ )

This cost estimate allows for 10 years of maintenance dredging, noting that dredging would be a significant ongoing cost.

### 6.3.11 Limpus Avenue (Pumpkin Creek)

Pumpkin Creek is a small coastal creek that forms the southern boundary of the Keppel Sands residential community. At present, two one-lane boat ramps approximately 200m apart provide access from the northern bank into the creek. The ramps are bordered by residential properties and aside from six dedicated CTU parks, parking is on-street. The ramps are more than 800m upstream of the creek mouth, and are heavily tidally restricted for access, with Pumpkin Creek unnavigable by many vessels at lower tides.

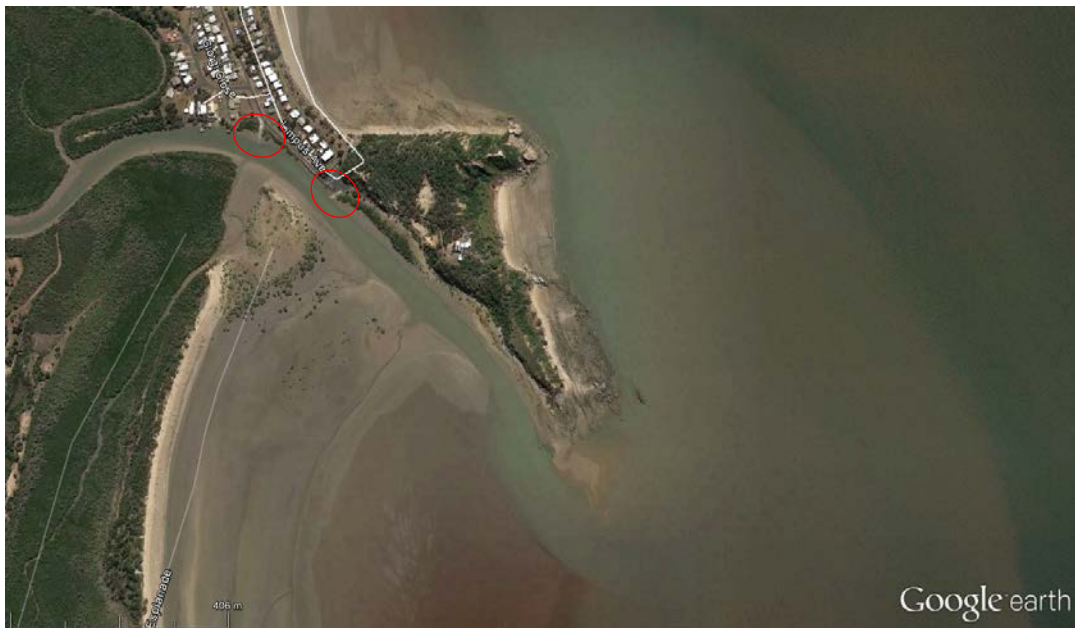


Figure 11 – Pumpkin Creek (13 May 2016) (ramp locations circled)

As the creek channel crosses a wide intertidal flat, a dredged channel would need to be more than 2km long to reach open-water of sufficient depth. However, the narrowness of the creek and its small coastal catchment indicate that creek flows are too low to naturally sustain a wider channel. A dredged channel would be likely to rapidly infill, requiring regular dredging to maintain access. The creek width also impacts on the provision of a floating walkway, as a conventional ramp-parallel walkway would restrict navigation.

Aside from the local community, the closest population centre is Emu Park, approximately 30 minutes drive away. With no room to expand parking and onerous dredging requirements, expansion of this site for additional ramp lanes is not considered to be practical or feasible.

Estimated cost: \$30 million (to  $\pm 50\%$ )

This cost estimate allows for 10 years of maintenance dredging, noting that dredging would be a significant ongoing cost, but excludes the cost of land purchase for CTU parking.

### 6.3.12 Thompson Point

This site is located on the Fitzroy River within Livingstone Shire, approximately 15km upstream of the river mouth and 34km downstream of the Rockhampton central business district. It is undeveloped, but accessible via a gravel road. The existing access road is not wholly located within the road reserve, and in places is on freehold or unallocated state land. However there is full legal road reserve access to the river.

The site currently contains an informal boat ramp at the end of the gravel road and the surrounding unallocated state land is used for occasional informal camping. There is sufficient room for parking areas to be established. Water depths in the river are suitable for navigation by recreational vessels.



Figure 12 – Thompson Point (13 May 2016) (informal ramp location circled)

Due to its location in the Fitzroy River, and proximity to Rockhampton, this facility is likely to be used by Rockhampton residents as well as those from Livingstone Shire seeking estuarine fishing/crabbing and camping opportunities. It also provides close access to the northern side of the Fitzroy River delta. Travel time by car from Rockhampton to Thompson Point is similar to the travel time from Rockhampton to Coorooman Creek. The site is sufficiently close to open water to attract some users for that purpose.

Minimum works required: new 2-lane boat ramp, floating walkway/pontoon, gravel car park establishment.

Estimated cost: \$3 million (to  $\pm 50\%$ )

Establishment of a 4-lane ramp in this location is not considered necessary at this time.

### 6.3.13 Port Alma

Port Alma is currently the only boat ramp facility within the Rockhampton Regional Council area that provides all-tide, open-water access close to the coast. The entire port area lies on reclaimed land, and is accessed via Bajool-Port Alma Road, which forms a causeway across wide inter-tidal flats.

The popular existing 2-lane facility on Raglan Creek has informal parking and no floating walkway, and is very close to port activities. An upgrade and expansion of the facility is highly desirable, however the existing facility is immediately upstream of the main port loading area, and within the 35kPa risk area for explosives handling operations at the port. Relocation of the boat ramp facility out of the risk area is therefore desirable.

The broader Port Alma area sits within the delta of the Fitzroy River, and therefore is vulnerable to fluvial inundation as well as storm surge. Aside from the access road and port-specific areas, the surrounding land is flat, low-lying, silty and largely fringed by mangroves. The level of the tidal flats varies but is in the order of 2.0 to 2.5m AHD. These flats are inundated on tides higher than Mean High Water Springs and during floods. Relocating the Port Alma boating facility to a new location will necessitate reclamation for access and parking to elevate these assets above flood and storm tide levels.

The existing facility provides direct or close access into the extensive Raglan Creek / Inkerman Creek system, and the Connor Creek system via Kamiesh Passage. Open-water is approximately 5km downstream.

Several sites in the Port Alma area were considered for establishing a new recreational boating facility, as shown in Figure 1. As vehicular access across the intertidal flats to reach the waterway requires a causeway, the cost of facility construction increases significantly with distance from Port Alma Road.

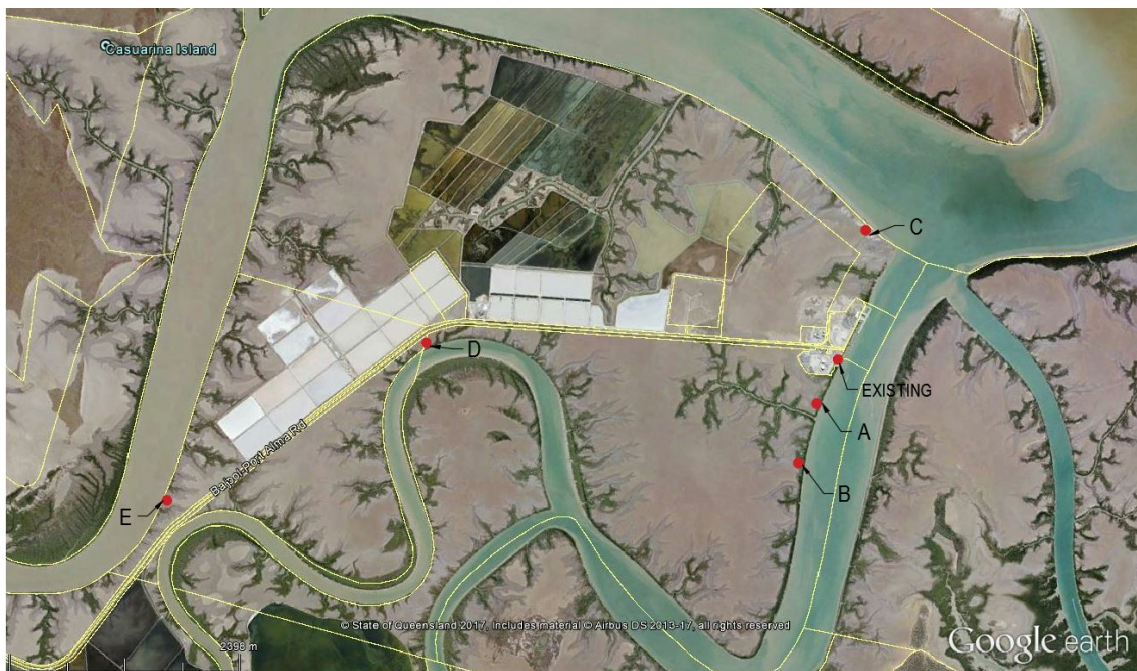


Figure 13 – Port Alma alternative sites considered

All sites have ample room for establishing a raised car park. The undeveloped nature of these sites means that access to navigable water may require interference with established mangroves, which would need to be addressed as part of any approvals.

To meet existing and future demand, the minimum works required are a new 4-lane boat ramp, floating walkway, reclamation for car park. The length of causeway required for access varies from site to site.

### **Site A**

Site A is located on reserve land approximately 500m upstream of the existing ramp on Raglan Creek. The area provides excellent access to deep water and its proximity to the existing ramp results in very little change to the waterways accessed compared to the current facility. A causeway approximately 600m long is required to reach the parking area.

However, as this site is located within the 21kPa explosives risk area, it is unlikely to be supported by approvals agencies.

Estimated cost: \$19 million (to  $\pm 50\%$ )

### **Site B**

Located approximately 1200m upstream of Site A on Raglan Creek on the same reserve, Site B also provides access to deep water, however requires a 900m long causeway and a creek crossing to reach the parking area. It is located within the 7kPa explosives risk area.

The cost for road and bridge construction to reach the parking area is anticipated to render this site uneconomical to construct compared to other locations.

Estimated cost: \$31 million (to  $\pm 50\%$ )

### **Site C**

This site is located approximately 1700m downstream of the existing facility, on reserve land close to Eupatoria Point, at the confluence of Raglan and Casuarina Creeks (just south of the junction with Fitzroy River). It provides excellent access to open-water but is more exposed to wind and wave action approaching through Keppel Bay. This may impact on the ability to provide a floating walkway or other boat holding structure at the site.

There is no existing road access to this location, with Bajool-Port Alma Road passing approximately 1.5km to the south. The closest private roads are internal port roads that come within 800m of the site, and access roads to commercial salt-pan facilities pass within 1.1km. Public use of these private roads is unlikely to be practical or feasible owing to security and safety concerns.

The site is located within the 14kPa explosives risk area. Shortening the length of an access road by passing closer to port operations is unlikely to be supported by port managers.

The length of causeway required to reach this site from Bajool-Port Alma Road is expected to result in excessive costs compared to other sites and is unlikely to be approved by funding agencies.

Estimated cost: \$35 million (to  $\pm 50\%$ )

### **Site D**

Located approximately 8.7km upstream and approximately 4.4km west of the existing facility, Site D is located on a sweeping bend of Bajool-Port Alma Road, and straddles unallocated state land and the reserve containing Sites A and B. The site provides direct access into Inkerman Creek, which is a tributary of Raglan Creek. Open-water is approximately 12km downstream. The narrowness and orientation of the creek and adjoining land areas limit wave action affecting the site.

Bajool-Port Alma Road is close to the site and access would not require a causeway in addition to reclamation for car parking. However, the Inkerman Creek channel is narrow at lower tides and sedimentation creates localised mobile shallow points between the site and Raglan Creek. It is anticipated that consistent all-tide navigation to and from open-water from this site would require periodic dredging, navigation aids and/or reduced speed limits.

At lower tides, larger vessels travelling in opposite directions may have difficulty safely passing one another, particularly at speed or at night. The isolation and crocodile habitat of the site exacerbates the consequences of any boating accidents in this area. Upstream of the ramp, water depths limit the extent of navigable access.

This site is therefore suitable for a smaller, local ramp (e.g. up to 2-lanes), and mainly for use by smaller vessels, but is not recommended as a major, district-level all-tide open-water access facility. A cost estimate at this site for a 4-lane ramp is therefore not provided.

Site D is well outside the port's explosives risk area, and avoids traffic passing through the operational port area, representing a key land-based safety advantage over sites A, B and C.

### **Site E**

This site provides direct access into Casuarina Creek, approximately 13.7km by water and 7.5km south-west of the existing facility. Casuarina Creek meets Raglan Creek approximately 1.5km downstream of the existing boat ramp, and has a wide, relatively stable channel with water depths that provide all-tide access to open water. Open-water is approximately 14km downstream.

Positioned at the southern end of a 5.6km north-south oriented reach of the creek, the site is exposed to northerly winds and waves generated by winds blowing down the reach, but is sheltered from waves generated by dominant north-easterly to south-easterly winds.

Site E provides ready access upstream and downstream into the extensive waterways between Port Alma and the Fitzroy River, including Alligator Creek, with navigable access to the Fitzroy River via the upstream end of Casuarina Island (Alligator Passage and Satellite Channel) possible on higher tides. This area is currently less accessible than the waterways around Balaclava Island, which are closer to the existing Port Alma recreational boat ramp facility.

Bajool-Port Alma Road is close to the site and access would not require a causeway in addition to reclamation for car parking. The site is on unallocated state land.

Site E is well outside the port's explosives risk area, and avoids traffic passing through the operational port area, which like site D represents a key land-based safety advantage over sites A, B and C.

Estimated cost: \$10 million (to ±50%)

### **Discussion**

The Fitzroy River delta covers a large area and is composed of numerous waterways. The existing Port Alma facility is centrally located within this area, providing reasonably close access to all parts of the delta.

Establishing a new facility away from this location therefore presents difficulties in meeting existing public expectations regarding accessibility to existing boating destinations. The two sites identified as being suitable for establishing a new recreational boating facility are Sites D (Inkerman Creek) and E (Casuarina Creek). Of these sites, only Casuarina Creek provides unimpeded navigation to open-water.



However, many users of the existing Port Alma facility do not seek access to open-water, preferring instead to remain within the estuary and its waterways, primarily for fishing and crabbing. Stakeholders anticipate the recreational fishing community continuing to seek close access into Raglan Creek and Kamiesh Passage (Balaclava Island), in preference to long on-water travel times from Casuarina Creek.

Access into waterways around Balaclava Island is some 3km further from Site E (13km) compared to site D (10km), although cautious navigation would likely be required for the first 3km of travel from Site D due to the narrowness of the channel, making travel times to Kamiesh Passage comparable to those from Casuarina Creek.

This assessment of capacity and demand for recreational boating facilities in the region identifies the key shortfall in boat ramp lanes is for facilities providing access to open water, rather than estuaries. Casuarina Creek (Site E) satisfies both of those needs, but it is recognised that Site E provides less-timely access into the Raglan Creek system. Consideration should therefore be given to the provision of two facilities in the Port Alma area, one to meet demand for access to open-water (Site E – Casuarina Creek), and the other to satisfy community desire for direct access to Raglan Creek (Site D – Inkerman Creek).

## 7. Development priorities

### 7.1 Methodology for selecting priorities

#### 7.1.1 Boat ramp facilities

The selection of recommended works and their priority is considered on several levels. The first level of consideration for increasing boat ramp capacity is founded on two main criteria:

- type of access required – open-water or non-open-water
- preference for expansion of existing facilities if suitably located.

Expansion of existing facilities if space allows is preferred over the establishment of new facilities in locations where travel times for most users to the existing facilities are not onerous. In these cases, road infrastructure for access is already in place and the foreshore is currently allocated to the purpose.

TMR's *Marine Facilities and Infrastructure Plan* (2016)<sup>13</sup> also guides the prioritisation of boating facilities. The plan says:

*“The department favours proposals for boat launching and landing facilities that give access to the open sea at all tides.*

*Priority will be given to the provision of sheltered all-tide or near all-tide launching facilities giving access to the open sea on an all-tide or near all-tide basis.*

*Part-tide facilities (for launching or access) may be provided where there is demand, and dredged access is not feasible. For instance, beach access or open beach ramps may be provided where there is sufficient demand and no suitable nearby sheltered waterway.”* (Section 3.1.1 – Coastal locations – guideline).

*“Access channels are not normally provided to open beach boat ramps. Beach access and open beach boat ramps are regarded as part-tide facilities.”* (Section 6.8 – Dredging of access channels to beach ramps – guideline).

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<sup>13</sup> TMR (2016) Marine Facilities and Infrastructure Plan

The process used within each LGA or region to identify opportunities to meet the need for ramp lanes for each type of access (open-water/non-open-water) at each of the priority time steps (2016, 2021, 2026 and 2036), is set out in the flowchart in Figure 14. Once the forecast shortfall for ramp lanes for a priority level has been met, further consideration of facilities falls to the next priority level until all forecast shortfall is met.

#### 7.1.2 Deep-draught vessel landings

The criteria for recommended works and priorities for landings comprises:

- the geographical spread of existing facilities
- unserviced destinations and popular anchorages
- access to water of sufficient depth
- access to landside services (shops or transportation) for mainland locations.

In some instances, deep water is not available and so provision for access by tenders or at higher tides is made. Where deep water is available, landings are best configured to allow tenders unrestricted berthing times on pontoon faces other the primary deep-water face.

In most instances where demand for additional landings is identified, there are very few locations that satisfy all needs. The prioritisation of recommendations for these facilities is based on stakeholder perceptions of urgency. From a stakeholder perspective, the demand for landings is all current (that is, now). However, the recommendations have matched the timing of new landings to the demand forecast.

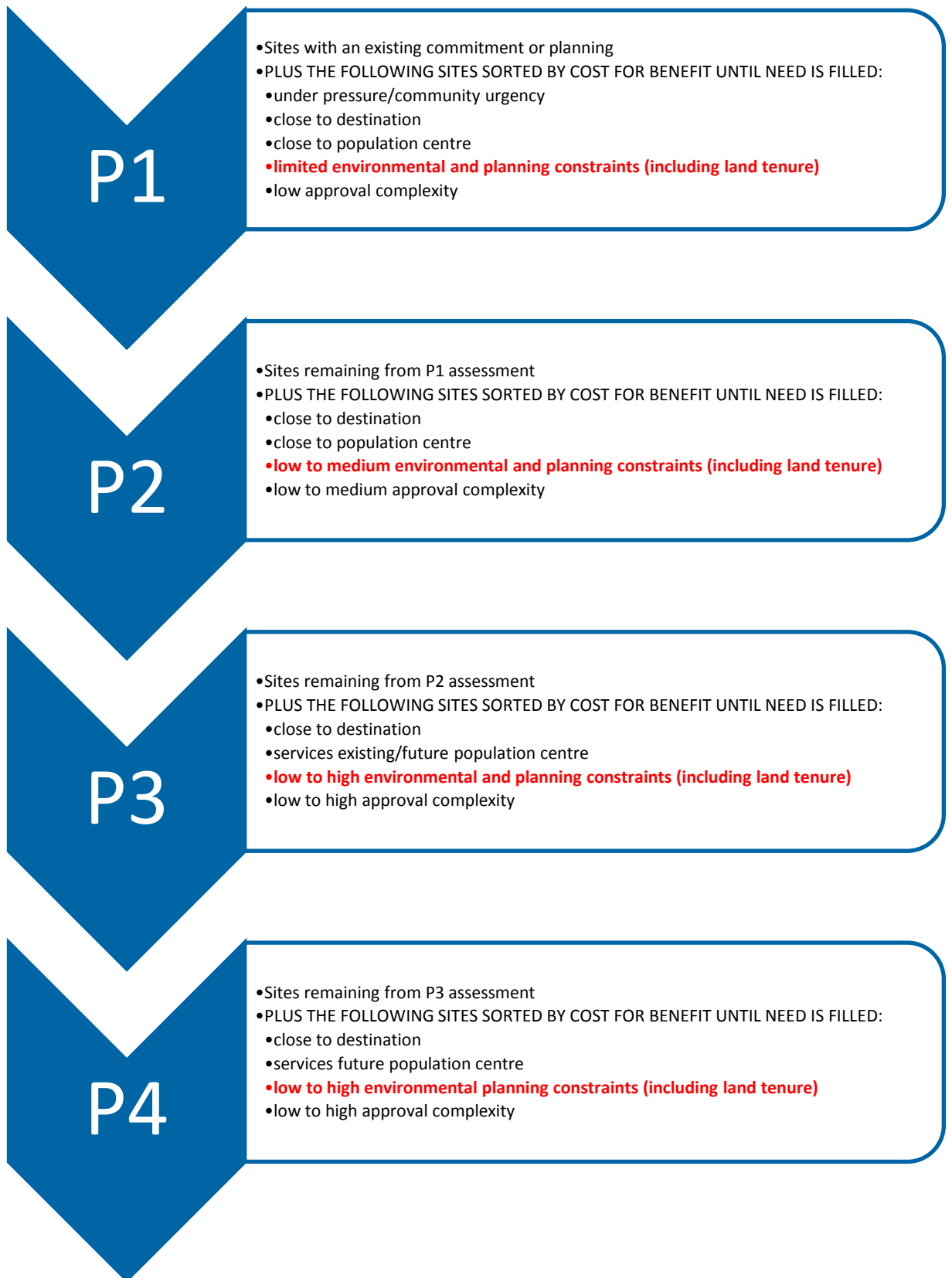


Figure 14 – Priority selection methodology

## 7.2 Recommended priorities

Table 16 – Recommended priorities to increase capacity, Livingstone – Rockhampton region

Priority	Sites
Priority 1 (as soon as possible)	New facility at Thompson Point – construct a near all-tide or all-tide 2-lane ramp, and formalise all-weather parking for 45 CTU spaces.
	Stanage Bay – extend ramp to improve tidal access, construct rock breakwater to shelter ramp and install floating walkway to act as a landing and for ramp queuing.
	Rossllyn Bay – increase parking by approximately 33 CTU spaces to improve efficient use of the existing water-side infrastructure and satisfy approvals agencies that Rossllyn Bay is being optimised prior to moving to a greenfield site.
	New facility at Port Alma: Option 1 – a 4-lane ramp with a floating walkway and 90 CTU spaces at Casuarina Creek. <u>OR</u> Option 2 - two new facilities at Port Alma, both comprising a 2-lane ramp with a floating walkway and 45 CTU spaces, one at Casuarina Creek, and one at Inkerman Creek Reclamation works at both sites are required. Decommission existing 2-lane Port Alma facility.
Priority 2 (over the next five years)	A new 4-lane open-water facility on the Capricorn Coast – refer to section 7.9 for potential options.
Priority 3 (over the next five to ten years)	Corbetts Landing – upgrade facility to a near all-tide or all-tide 2-lane ramp, and formalise parking for 45 CTU spaces. This recommendation recognises that Corbetts Landing remains distance-limited for access to the open sea, and will be primarily used for estuarine access.
Priority 4 (other)	A second new 4-lane open-water facility on the Capricorn Coast – refer to section 7.9 for potential options.
	Additional pontoon – site dependent on selection of new 4-lane open-water facility. Causeway Lake option could allow for new pontoon. Alternatively, installation of a public pontoon in Rossllyn Bay Boat Harbour could be considered.
	Quay Street, Rockhampton – installation of a flood-resistant pontoon associated with decommissioning of the Derby Street jetty.

Infrastructure upgrades within Rossllyn Bay Boat Harbour would provide the opportunity for an additional landing to satisfy demand by 2036. Alternatively, the establishment of a harbour at Causeway Lake would be expected to contain a commercial marina development. The increase in capacity provided by this commercial development would also satisfy demand for one additional landing by 2036.

### 7.3 Additional recommendations

When the public jetties in Rosslyn Bay Boat Harbour reach the end of their design life, consideration should be given to replacement of one of the jetties with a pontoon, specifically to cater for recreational access.

### 7.4 Capacity evaluation incorporating development priorities

The effective lane capacity has been reassessed to incorporate the delivery of the recommended development priorities as shown in Table 17, and described in detail in the following sections. The increase in effective lanes gained by each recommendation is shown in the relevant table for that recommendation. For post-delivery effective capacity in 2021 and 2036, the open-water capacity has been calculated by incorporating one of the options presented in section 7.9 for that time period.

Table 17 – Effective lane and landing capacity after delivery of recommended priorities, Livingstone – Rockhampton region

Evaluation category	Existing effective capacity*	2016		2021		2026		2036	
		Demand	Post-delivery effective capacity*	Demand	Post-delivery effective capacity	Demand	Post-delivery effective capacity	Demand	Post-delivery effective capacity
Open-water access*	13	19	18.5	20.5	22.5	22	22.5	25.5	26.5
Non-open-water access	18	14.5	18	15.5	18	16.5	19.5	19	19.5
All vessels, all facilities	<b>31</b>	<b>33.5</b>	<b>36.5</b>	<b>36.0</b>	<b>40.5</b>	<b>38.5</b>	<b>42</b>	<b>45</b>	<b>46</b>
# of landings*	6	6	7	7	7	7	7	8	8

\*Existing effective capacity incorporates MIIP announced projects/upgrades as at December 2016, including Robert Clark Drive, Callaghan Park, North Rockhampton, which was under construction at the time of writing (October 2017)

\*Effective capacities are reported to the nearest 0.5 of a lane

\*The calculation for open water access assumes a 4-lane facility constructed at Casuarina Creek (Port Alma)

\*# of landings consists of public sheltered mainland landings, public island landings – supplies available and major private landings

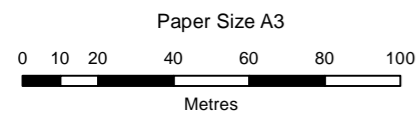
## 7.5 Priority 1 sites

Table 18 – Priority 1 – Rosslyn Bay Boat Harbour

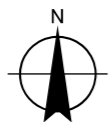
Site name	Rosslyn Bay Boat Harbour
Existing formal facility?	Yes
Location	Just south of Yeppoon in Rosslyn, off the Scenic Highway on Vin E Jones Memorial Drive. Proposed parking location is between Vin E Jones Memorial Drive and Shoreline Close.
Current tidal status	All-tide, open-water access
Site characteristics	<p>Rosslyn Bay Boat Harbour is a state boat harbour, located just under three nautical miles south-east of Yeppoon. Public facilities in the harbour consist of two boat ramps, each comprising 4-lanes with a floating walkway, and three jetties that act as deep-draught landings. The depth of the harbour is maintained to provide all-tide access. 241 CTU spaces are provided in total for the two boat ramps.</p> <p>The Coast Guard is located within the harbour, as well as a number of private developments, including marina facilities, fuel facilities, charter and cruise businesses, and seafood sales.</p> <p>Both entry and exit of the harbour is via a single road (Vin E Jones Memorial Drive). The site is constrained to the north-east and south by the Capricorn Coast National Park.</p>
Proposed works	Expand parking by approximately 33 CTU spaces.
Increase in effective lanes provided by works	1 effective lane.
Rationale	<p>Rosslyn Bay Boat Harbour represents one of only two all-tide facilities in the Livingstone – Rockhampton region to provide direct open-water access. Rosslyn Bay is closer to the population centres of Yeppoon and Emu Park than the other all-tide open-water access facility at Port Alma, and provides protected open water access to key island and reef destinations.</p> <p>To reduce or delay adverse impacts on the environment, the capacity of existing sites in already disturbed environments should be maximised before new greenfield sites are developed. An increase in capacity of the existing Rosslyn Bay facilities will assist in meeting demand in the short to mid-term, allowing time to assess the feasibility of other long-term opportunities, particularly those that may only be viable through private investment (such as the Causeway Lake option described in Section 7.9).</p> <p>Currently the waterside capacity of the Rosslyn Bay facilities notionally exceeds that of the landside capacity. An increase in parking capacity will support more efficient use of the existing waterside components of the facility, therefore increasing throughput, especially at busy times. A parking increase will also support future works to improve the efficiency of the current waterside configuration.</p>

Site name	Rosslyn Bay Boat Harbour	
Environmental and planning constraints	<p>ILUA area; DATSIP Cultural Heritage Database search recommended. TMR to undertake negotiations with registered traditional owners of the land to prepare and execute a CHMP for the works.</p> <p>World and National Heritage Place – Great Barrier Reef and one listed threatened ecological community – Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions is predicted as ‘likely to occur’. In Queensland, Semi-evergreen vine thicket threatened ecological communities are represented by a range of regional ecosystems. Regional ecosystem mapping shows the project area as non-remnant and as such, it is unlikely that Semi-evergreen vine thicket is present. The works are unlikely to impact on MNES, if works are likely to impact MNES then a referral under the EPBC Act must be made to DEE.</p> <p>Category X vegetation; disturbed area – impact unlikely. Within flora trigger mapping area. Impact is unlikely. Site survey required if clearing is to occur per EHP Flora Survey Guidelines- Protected Plants and report submitted to EHP prior to construction. If clearing is to an NC Act clearing permit may be required.</p> <p>TMR’s ‘Species Management Program for Tampering with Animal Breeding Places’ and ‘Protected plant exemption’ agreement may apply depending on works.</p> <p>If clearing is to be undertaken within the road reserve and if it is undertaken by TMR, an NC Act clearing permit will not be required. If clearing is to occur outside of the road reserve, an NC Act clearing permit will be required.</p> <p>The works are located within the Open Space Zone of the Livingstone Planning Scheme. A local utility is accepted development if it can meet the requirements under the Open Space Zone Code, otherwise it becomes code assessable.</p> <p>The operational works are exempt from assessment against the local planning scheme as the works would be undertaken by or on behalf of a public sector entity (TMR) (Shd 6 Part 3, Section 8 of P Reg).</p> <p>Freehold tenure.</p>	
Consultation feedback	LSC supports the proposal and the priority rating.	
Indicative cost (excl. GST) (to ±50%)	Water-based infrastructure	\$ -
	Land-based infrastructure (includes allowance for replacement of non-engineering fill, as fill quality at site is unknown)	\$ 1,080,000

Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines) 2016. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.



Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



LEGEND

- Populated Places
- State controlled road
- Cadastre
- Carpark



Department of Transport and Main Roads  
Queensland Recreational Boating Demand Study

Job Number 41-30098  
Revision A  
Date 02 Aug 2017

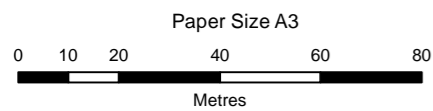
**Boating facility  
Roslyn Bay Carpark Extension**



Table 19 – Priority 1 – Thompson Point Road, Thompson Point

Site name	Thompson Point Road, Thompson Point
Existing formal facility?	No
Location	Fitzroy River, at the end of Thompson Point Road, Thompson Point
Current tidal status	All-tide, open-water access
Site characteristics	<p>Thompson Point is an undeveloped site on the Fitzroy River used for camping and boat launching. An informal gravel boat ramp is in place at the end of Thompson Point Road. A recent hydrographic survey indicates sufficient water depths for a formal boat ramp at this site.</p> <p>The site is vegetated by a light density of mature trees with grass understorey, although a well-used vehicular access track runs along the shoreline above the typical inundation level.</p> <p>The site is relatively flat close to the river bank, but is narrow and backed by a large hill south of the informal boat ramp. Close to the informal boat ramp the land is flat or gently sloping and is easily accessible by vehicles.</p> <p>Historical usage of the site is evident. The wreckage of long abandoned structures and sunken vessels line the bank downstream of the ramp, and an abandoned quarry adjoins the road reserve. The general area around the point was also used in World War II, and the exact location of any particular historical features of interest would need to be determined and protected as part of future planning.</p> <p>The existing access road is not wholly located within the road reserve, and in places is on freehold or unallocated state land. However there is full legal road reserve access, the alignment of which may be preferred if the road is upgraded.</p>
Proposed works	<p>Upgrade of the boat ramp to provide two near all-tide or all-tide lanes, and provision of a floating walkway.</p> <p>Formalise the parking area to provide 45 CTU spaces.</p>
Increase in effective lanes provided by works	2 effective lanes
Rationale	<p>Due to its location in the Fitzroy River and proximity to Rockhampton township, this facility is likely to be used by Rockhampton Regional residents as well as those from Livingstone Shire seeking estuarine fishing/crabbing and camping opportunities. It also provides close access to the northern side of the Fitzroy River delta. Travel time by car from Rockhampton to Thompson Point is similar to the travel time from Rockhampton to Coorooman Creek. The site is sufficiently close to open-water to attract some users for that purpose.</p>
Environmental and planning constraints	<p>ILUA area; DATSIP Cultural Heritage Database search recommended. TMR to undertake negotiations with registered traditional owners of the land to prepare and execute a CHMP for the works.</p> <p>World Heritage and National Heritage place – Great Barrier Reef and Nationally important wetland – Fitzroy River Delta – the works are unlikely to impact on MNES, if works are likely to impact MNES then a referral under the EPBC Act must be made to DEE.</p> <p>Category X vegetation; disturbed area – impact unlikely.</p> <p>Within flora trigger mapping area. Impact is unlikely.</p> <p>Site survey required if clearing is to occur per EHP Flora Survey Guidelines- Protected Plants and report submitted to</p>

Site name	Thompson Point Road, Thompson Point	
	<p>EHP prior to construction. If clearing is to an NC Act clearing permit may be required.</p> <p>TMR's 'Species Management Program for Tampering with Animal Breeding Places' and 'Protected plant exemption' agreement may apply depending on works.</p> <p>If clearing is to be undertaken within the road reserve and if it is undertaken by TMR, an NC Act clearing permit will not be required. If clearing is to occur outside of the road reserve, an NC Act clearing permit will be required.</p> <p>Marine plants may be located within the site. Removal of marine plants will require an Operational Works permit for the removal, destruction or damage of marine plants under P Act (Shd 3 Table 4 Item 8 of P Reg). May be self-assessable if works can comply with Shd 3 Table 4 item 4 (b) and (d) of the P Reg.</p> <p>Environmental Relevant Activity 16 extracting and screening activities for dredging more than 1000 tonnes of material in a year may be triggered depending on works (P Reg Shd 3, Table 2, Item 1).</p> <p>Operational Works for tidal works or works within a coastal management district is triggered under P Act for the works in the tidal area. Works are self-assessable if the work is mentioned in a code for the self-assessable operational work declared under the CPM Reg to be a code for IDAS (P Reg Shd 3 Part 2, Table 4 Item 8 (b)).</p> <p>FHA A is located in the site area. Building work or operational work in a declared FHA require a development permit under P Act. May be self-assessable if works can comply with Shd 3 Table 1, Item 3 (a) and (d) and Table 4 item 3 (b) and (d) of the P Reg.</p> <p>The works are located within the Rural Zone of the Livingstone Planning Scheme. A landing is exempt development in this zone. A utility installation would require self-assessment against the relevant codes of the planning scheme.</p> <p>The operational works are exempt from assessment against the local planning scheme as the works would be undertaken by or on behalf of a public sector entity (TMR) (Shd 4 Table 4 (1) of P Reg).</p> <p>Unallocated state land.</p>	
Consultation feedback	<p>Improved ramp design and provision of queuing structure is supported by LSC. Floating walkway may be vulnerable to flood flows and alignment of the ramp and walkway will need to take this into account.</p> <p>Parking preferred to be sited on road reserve rather than unallocated state land, or on land when tenure issues have been resolved.</p> <p>Sealing of car park and access road not supported.</p> <p>LSC would consider a joint project approach with RRC.</p>	
Indicative cost (excl. GST) (to ±50%)	Water-based infrastructure	\$2,120,000
	Land-based infrastructure	\$820,000 (unsealed)



Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



LEGEND

- Populated Places
- State controlled road
- Cadastre
- Carpark
- Floating Walkway
- Boat Ramp



Department of Transport and Main Roads  
Queensland Recreational Boating Demand Study

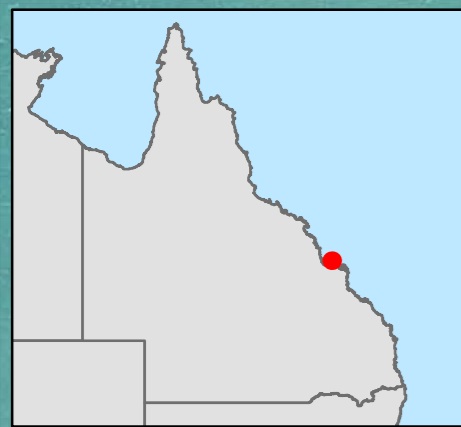
Job Number 41-30098  
Revision A  
Date 16 Dec 2016

**Boating facility  
Thompson Point**

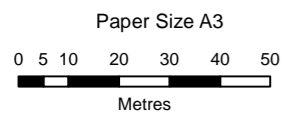
Table 20 – Priority 1 – Banksia Road, Stanage Bay

Site name	Banksia Road, Stanage Bay
Existing formal facility?	Yes
Location	South bank of Thirsty Sound, at the end of Banksia Rd, Stanage Bay (also known as Stanage, Stannage or Plum Tree)
Current tidal status	Part-tide, open-water access
Site characteristics	<p>The existing boat ramp at Stanage Bay services the local township, and provides access into Thirsty Sound and Shoalwater Bay. Navigable access to and from the ramp is limited by the shallow nearshore water depths and the large (7m+) tidal range in the area.</p> <p>The existing boat ramp has been cut through an outcropping rock shelf. Sand dunes are perched on the rock shelf at the highest tide levels, but there is no available beach at most tides for several hundred metres on either side of the ramp to assist with launching and retrieval manoeuvres.</p> <p>The existing ramp adjoins an unsealed informal parking area and shop.</p> <p>In addition to the ramp, the area is also a popular anchorage, particularly for vessels travelling between Rosslyn Bay and Mackay. However, there is no landing facility in the area, and the rocky shoreline makes accessing the township from these vessels problematic.</p>
Proposed works	<p>Upgrade boat ramp to improve part-tide access. Construct a rock breakwater to improve sheltering of the ramp from northerly winds and north-easterly waves.</p> <p>Provide a floating walkway on one side of the ramp for combined use on most tides as a queuing facility and a tender dinghy landing for deep draught vessels anchored offshore, and as a landing for deep-draught vessels at higher tides.</p> <p>Formalise the parking area to provide 45 CTU spaces.</p>
Increase in effective lanes provided by works	0.5 effective lanes
Rationale	<p>Stanage Bay is a convenient overnighting/anchorage point for cruising vessels between Rosslyn Bay and Mackay. However, the lack of a landing facility means that vessels are not able to safely or conveniently access the nearby township. While a sheltered deep-draught landing is preferred, the shallow nature of the nearshore area means that this could only be achieved through the construction of a breakwater several hundred metres long. A more practical and economical solution is the provision of a shorter breakwater to shelter a launching facility and landing for tenders of deep-draught vessels on most tides.</p> <p>Extension of the boat ramp will make the ramp accessible over a greater portion of the tidal cycle than the current ramp, but will not make the facility accessible at all-tides.</p> <p>These improvements are expected to have flow on economic benefits for the local community.</p>

Site name	Banksia Road, Stange Bay	
Environmental and planning constraints	<p>Some greenfield development is proposed.</p> <p>ILUA area; DATSIP Cultural Heritage Database search recommended. TMR to undertake negotiations with registered traditional owners of the land to prepare and execute a CHMP for the works.</p> <p>World Heritage and National Heritage place – Great Barrier Reef and Nationally important wetland – Great Barrier Reef Marine Park. The works are likely to impact on MNES a referral under the EPBC Act must be made to DEE.</p> <p>Works in the marine park may require a marine parks permit.</p> <p>Marine plants are located within the site. Removal of marine plants will require an Operational Works permit for the removal, destruction or damage of marine plants under P Act (Shd 3 Table 4 Item 8 of P Reg). May be self-assessable if works can comply with Shd 3 Table 4 item 4 (b) and (d) of the P Reg.</p> <p>Environmental Relevant Activity 16 extracting and screening activities for dredging more than 1000 tonnes of material in a year may be triggered depending on works (P Reg Shd 3, Table 2, Item 1).</p> <p>Operational Works for tidal works or works within a coastal management district is triggered under P Act for the works in the tidal area. Works are self-assessable if the work is mentioned in a code for the self-assessable operational work declared under the CPM Reg to be a code for IDAS (P Reg Shd 3 Part 2, Table 4 Item 8 (b)).</p> <p>Category B vegetation, least concern RE 11.1.4. Exemptions apply for clearing native vegetation on land generally that is clearing for the construction or maintenance of community infrastructure mentioned in Shd 2 of P Reg that is government supported transport infrastructure.</p> <p>The works are located within the Environmental Management and Conservation Zone of the Livingstone Planning Scheme. A landing is code assessable development in this zone. A utility installation is exempt development in this zone.</p> <p>The operational works are exempt from assessment against the local planning scheme as the works would be undertaken by or on behalf of a public sector entity (TMR) (Shd 4 Table 4 (1) of P Reg).</p> <p>Unallocated state land.</p>	
Consultation feedback	<p>LSC support concept and priority. Pontoon to be designed for use by deep-draught vessels, and accessible to tenders at low tides/max tidal range.</p> <p>Parking preferred to be sited on road reserve rather than unallocated state land, or on land when tenure issues have been resolved. The state would be requested to provide the land required for parking as road reserve.</p> <p>Tender and construction phases to include consideration of LSC quarrying requirements and use of local contractors.</p>	
Indicative cost (excl. GST) (to ±50%)	Water-based infrastructure	\$ 3,620,000
	Land-based infrastructure	\$ 950,000 (unsealed)



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Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



LEGEND

- Populated Places
- Breakwater
- Floating Walkway
- State controlled road
- Carpark
- Boat Ramp
- Cadastre



Department of Transport and Main Roads  
Queensland Recreational Boating Demand Study

Job Number 41-30098  
Revision A  
Date 05 Oct 2017

**Boating facility  
Storage Bay**

To meet future demand for all-tide access to open water within the Livingstone – Rockhampton region, additional recreational boating facilities will be required. Given the limited opportunities to expand existing facilities to achieve this, a preliminary assessment of potential sites identified the following Capricorn Coast locations as worthy of further investigation (listed from north to south).

A new facility in the Port Alma area is required to replace and expand the capacity offered by the existing facility. As discussed in section 6.3.13, two sites are considered suitable for establishing a new facility. Options for facilities at these sites are presented below.

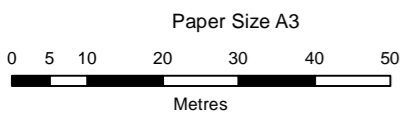
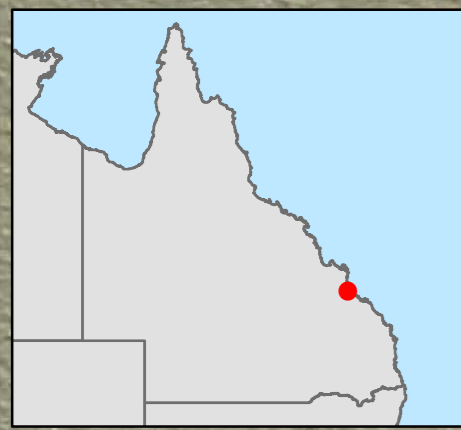
Table 21 – Priority 1 – Port Alma Option 1 – Casuarina Creek 4-lane

Site name	Casuarina Creek 4-lane
Existing formal facility?	No
Location	Right (southern) bank of Casuarina Creek, approximately 7.5km south-west of the existing Port Alma facility, at the closest point of Bajool-Port Alma Rd to Casuarina Creek.
Current tidal status	All-tide, open-water access
Site characteristics	<p>The site is currently an intertidal flat in the Fitzroy River delta, close to existing salt pans and the Bajool-Port Alma Rd. Casuarina Creek is located within 200m of the road, and is lined with salt-tolerant grasses and occasional mangroves. The creek has excellent water depths for recreational vessels to access open-water, and provides ready access upstream and downstream into the extensive waterways between Port Alma through to the Fitzroy River, with navigable access to the Fitzroy River via the upstream end of Casuarina Island possible under higher tide levels.</p> <p>The site is exposed to northerly winds and waves generated by winds blowing down the reach, but is sheltered from ocean and local waves generated by dominant north-easterly to south-easterly winds. While the site is vulnerable to flooding, flood velocities are not extreme due to the width of the floodplain.</p>
Proposed works	<p>4-lane ramp with a floating walkway and 90 CTU spaces. A feasibility study should be undertaken to determine if floating infrastructure is viable in this location.</p> <p>Significant reclamation will be required for the ramp and parking area.</p> <p>Decommissioning of the existing Port Alma boat ramp (2-lane ramp adjacent to the port).</p>
Increase in effective lanes provided by works	2 effective lanes
Rationale	<p>The existing Port Alma boat ramp is at the end of its design life and is due for an upgrade. However, the location of the current boat ramp is within close proximity to Port operations that may pose a risk to ramp users in an emergency. Relocation of the boat ramp facility out of the port's explosives risk area is therefore desirable. Other potential sites in the area would incur substantial additional costs such as a causeway across the intertidal flat for access, or for maintenance dredging.</p> <p>The ramp is popular and few alternative locations provide a similar level of access to the plentiful fishing grounds in this area, avoid passing through operational areas of the port and are in close proximity to a made road.</p>

Site name	Casuarina Creek 4-lane	
Environmental and planning constraints	<p>ILUA area; DATSIP Cultural Heritage Database search recommended. TMR to undertake negotiations with registered traditional owners of the land to prepare and execute a CHMP for the works.</p> <p>World and National Heritage place – Great Barrier Reef and Nationally Important Wetland – Fitzroy River Delta Wetlands – the works are likely to impact on MNES, a referral under the EPBC Act must be made to DEE.</p> <p>Category B vegetation, least concern RE 11.1.4d. Exemptions apply for clearing native vegetation on land generally that is clearing for the construction or maintenance of community infrastructure mentioned in Shd 21, Part 1, Section 14 (b) of P Reg that is government supported transport infrastructure.</p> <p>Not within a flora survey trigger area; impact unlikely.</p> <p>Marine plants may be located within the site. Removal of marine plants will require an Operational Works permit for the removal, destruction or damage of marine plants under P Act (Shd 10 Part 17 Item 28 of P Reg). May be accepted development if works can comply with the requirements under Shd 7 Item 8 of the P Reg.</p> <p>Environmental Relevant Activity 16 extracting and screening activities for dredging more than 1000 tonnes of material in a year may be triggered depending on works (P Reg Shd 10, Part 5, Div 2, Item 1).</p> <p>Operational Works for tidal works or works within a coastal management district is triggered under P Act for the works in the tidal area. Works are considered accepted development under the P Reg Shd 7 Part 3, Item 10 (b) for tidal works that is undertaken by TMR. Accepted development works are to comply with the requirements for the work prescribed under the Coastal Act, Section 167(5)(b).</p> <p>No FHA is located on site. No development permit for building work or operational work in a declared FHA is required.</p> <p>The works are located within the Rural Zone of the Rockhampton Planning Scheme. A landing is accepted development under this code. A 'utility installation' is code assessable development under the Rockhampton Region Planning Scheme.</p> <p>The operational works are exempt from assessment against the local planning scheme as the works would be undertaken by or on behalf of a public sector entity (TMR) (Shd 6 Part 3, Section 8 of P Reg).</p> <p>Unallocated State land.</p>	
Consultation feedback	<p>RRC agrees that this site is an immediate need.</p> <p>Extensive consultation between TMR, Gladstone Ports Corporation, and Rockhampton Regional Council has indicated this site to be the preferred one for an all-tide open water access alternative to the existing Port Alma facility. RRC desires an additional ramp facility for closer boating access to the Raglan Creek portion of the Fitzroy River delta (via Inkerman Creek).</p>	
Indicative cost (excl. GST) (to ±50%)	Water-based infrastructure	\$ 2,410,000
	Land-based infrastructure (including revetment)	\$ 7,290,000










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Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



LEGEND

-  Populated Places
-  Breakwater/Revetment
-  Floating Walkway
-  State controlled road
-  Carpark
-  Boat Ramp
-  Cadastre



Department of Transport and Main Roads  
Queensland Recreational Boating Demand Study

Job Number 41-30098  
Revision A  
Date 23 Oct 2017

**Boating facility  
Casuarina Creek**

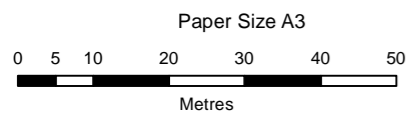
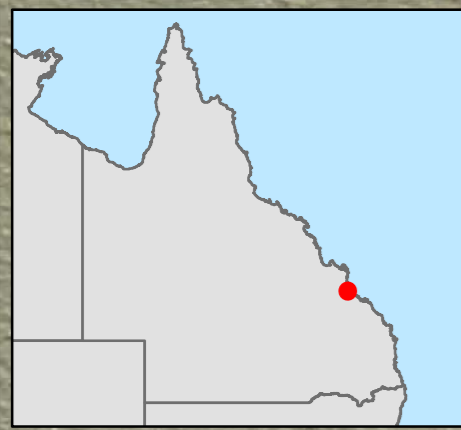
Table 22 – Priority 1 – Port Alma Option 2 – Casuarina Creek 2-lane AND  
Inkerman Creek 2-lane

Site name	Casuarina Creek 2-lane and Inkerman Creek 2-lane
Existing formal facility?	No
Location	Right (southern) bank of Casuarina Creek, approximately 7.5km south-west of the existing Port Alma facility, at the closest point of Bajool-Port Alma Rd to Casuarina Creek. and Left (northern) bank of Inkerman Creek, approximately 4.4km west of the existing Port Alma facility, on Bajool-Port Alma Rd
Current tidal status	Casuarina Creek – All-tide, open-water access Inkerman Creek – All-tide, depth-limited open-water access
Site characteristics	Casuarina Creek – as per description in Table 21. Inkerman Creek – the site is currently an intertidal flat in the Fitzroy River delta, close to existing salt pans and the Bajool-Port Alma Rd. Inkerman Creek is located within 170m of the road, and is lined with salt-tolerant grasses and occasional mangroves. At the ramp site the creek has good water depths for recreational vessels to access open-water, however the downstream channel is narrow and shallow at low tide. The site provides close access to Raglan Creek (the site of the existing boat ramp). The site is sheltered due to the narrowness of the Creek and proximity of vegetation. While the site is vulnerable to flooding, flood velocities are not extreme due to the width of the floodplain.
Proposed works	At each site, a 2-lane ramp with a floating walkway and 45 CTU spaces. Significant reclamation will be required for the ramps and parking areas.
Increase in effective lanes provided by works	1.6 effective lanes
Rationale	Decommissioning of the existing Port Alma boat ramp will remove direct access for vessels into Raglan Creek. Although Casuarina Creek will provide the main facility within the area, stakeholders anticipate that the recreational fishing community, and particularly small vessel owners, will seek continued close access into these waterways in preference to long on-water travel times from Casuarina Creek. Other potential sites in the area would incur substantial additional costs such as a causeway across the intertidal flat for access, or for maintenance dredging, or are within the port's explosives risk area. This is the closest site to the existing facility in close proximity to a made road that provides access into the same waterway, while avoiding passing through operational areas of the port.

Site name	Casuarina Creek 2-lane and Inkerman Creek 2-lane
Environmental and planning constraints	<p>Casuarina Creek – as per description in Table 21.</p> <p>Inkerman Creek:</p> <p>Within Indigenous Land Use Agreement – Port Curtis Coral Coast Claim and Darumbal People. No cultural heritage sites within 1km of site. TMR to undertake negotiations with registered traditional owners of the land to prepare and execute a CHMP for the works.</p> <p>Within 1km of World Heritage and National Heritage Property – Great Barrier Reef and Nationally Important Wetland – Fitzroy River Delta Wetlands – if the works are likely to impact on MNES, a referral under the EPBC Act must be made to DEE.</p> <p>Category B vegetation, least concern RE 11.1.4d. RE 11.1.4b are mapped within the site of the proposed works. The works impact a small section of the Category B remnant vegetation at the edge of the creek and along the road alignment. Exemptions apply for clearing native vegetation on land generally that is clearing for the construction or maintenance of community infrastructure mentioned in Shd 21, Part 1, Section 14 (b) of P Reg that is government supported transport infrastructure.</p> <p>Not within a flora survey trigger area; impact unlikely.</p> <p>Marine plants are located within the site. Removal of marine plants will require an Operational Works permit for the removal, destruction or damage of marine plants under P Act (Shd 10 Part 17 Item 28 of P Reg). May be accepted development if works can comply with the requirements under Shd 7 Item 8 of the P Reg.</p> <p>Environmental Relevant Activity 16 extracting and screening activities for dredging more than 1000 tonnes of material in a year may be triggered depending on works (P Reg Shd 10, Part 5, Div 2, Item 1).</p> <p>Operational Works for tidal works or works within a coastal management district is triggered under P Act for the works in the tidal area. Works are considered accepted development under the P Reg Shd 7 Part 3, Item 10 (b) for tidal works that is undertaken by TMR. Accepted development works are to comply with the requirements for the work prescribed under the Coastal Act, Section 167(5)(b).</p> <p>No FHA is located on site. No development permit for building work or operational work in a declared FHA is required.</p> <p>The works are located on three lots with the following zoning of the Rockhampton Planning Scheme:</p> <ul style="list-style-type: none"> <li>• 51 SP133750 zoned ‘Special Purpose’ (reserve land)</li> <li>• 11 USL 34991 zoned ‘Rural’ (unallocated state land)</li> <li>• 51 SP102240 is zoned ‘Special Purpose’ (lands lease)</li> </ul> <p>A landing is accepted development in the ‘Rural Zone’ and ‘Special Purpose Zone’. A ‘utility installation’ is accepted development if undertaken by a public sector entity in the Rural Zone’ and ‘Special Purpose Zone’.</p> <p>The operational works are exempt from assessment against the local planning scheme as the works would be undertaken by or on behalf of a public sector entity (TMR) (Shd 6 Part 3, Section 8 of P Reg).</p>

Site name	Casuarina Creek 2-lane and Inkerman Creek 2-lane	
Consultation feedback	<p>RRC agrees that the Casuarina Creek site is an immediate need.</p> <p>RRC desires an additional ramp facility for closer boating access to the Raglan Creek portion of the Fitzroy River delta (via Inkerman Creek).</p>	
Indicative cost (excl. GST) (to ±50%)	Water-based infrastructure	\$ 3,440,000
	Land-based infrastructure	\$ 9,400,000








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Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



LEGEND

-  Populated Places
-  Breakwater/Revetment
-  Floating Walkway
-  State controlled road
-  Carpark
-  Boat Ramp
-  Cadastre



Department of Transport and Main Roads  
Queensland Recreational Boating Demand Study

Job Number 41-30098  
Revision A  
Date 23 Oct 2017

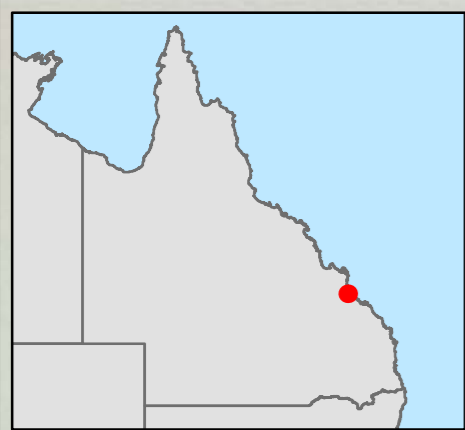
**Boating facility  
Casuarina Creek (2-lane)**

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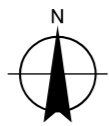
Data source: GHD: Layout/2016; DNRM: Roads/2015, Populated Places, Local Government Area/2016, Cadastre/2016; TMR: Facilities/2016, Imagery (2013-2016). Created by: AJ/MS










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Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



LEGEND

-  Populated Places
-  Breakwater/Revetment
-  Floating Walkway
-  State controlled road
-  Carpark
-  Boat Ramp
-  Cadastre



Department of Transport and Main Roads  
Queensland Recreational Boating Demand Study

Job Number | 41-30098  
Revision | A  
Date | 23 Oct 2017

**Boating facility  
Inkerman Creek**

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## 7.6 Priority 2 sites

A new 4-lane open-water facility – refer to section 7.9 for potential options.

## 7.7 Priority 3 sites

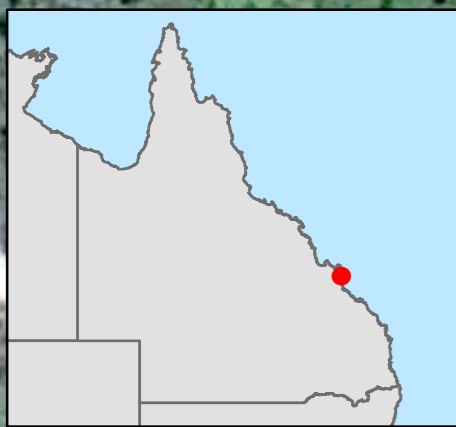
Table 23 – Priority 3 – Corbetts Landing Road, Corbetts Landing

Site name	Corbetts Landing Road, Corbetts Landing
Existing formal facility?	Yes
Location	Water Park Creek, Corbetts Landing Road, Byfield
Current tidal status	Part-tide, depth-limited and distance-limited open-water access
Site characteristics	<p>Corbetts Landing is an isolated 1-lane ramp approximately 20 minutes north of Yeppoon, east of Byfield Road. The site is accessed via approximately 6km of unsealed road. Parking at the site is unformed.</p> <p>Launching from the site at present is anecdotally possible on most tides, however insufficient information is available to confirm whether near all-tide access is achieved. The current boat ramp is prone to regular siltation, leading to a need for frequent cleaning. An upgrade should address this issue to the extent possible.</p> <p>While the site itself is located within a reserve, the eastern bank of Water Park Creek opposite the landing is within Byfield National Park for several kilometres in each direction. Water Park Creek provides near all-tide, distance-limited access to open-water via Corio Bay, although some local knowledge or care is required to navigate around sand banks and rock bars in the creek.</p>
Proposed works	<p>Upgrade the boat ramp to provide two near all-tide or all-tide lanes, and provision of a floating walkway.</p> <p>Formalise the parking area to provide 45 CTU spaces.</p>
Increase in effective lanes provided by works	1.5 effective lanes
Rationale	<p>This area is increasing in popularity for estuary fishing, and is used for fishing competitions. It also provides the sole access into an otherwise undeveloped part of the coast.</p> <p>An extension of the ramp would likely achieve greater availability on all tides, and formalisation of the parking would improve the capacity of the site.</p>

Site name	Corbetts Landing Road, Corbetts Landing	
Environmental and planning constraints	<p>ILUA (Indigenous Land Use Agreement) area; DATSIP Cultural Heritage Database search recommended. TMR to undertake negotiations with registered traditional owners of the land to prepare and execute a CHMP for the works.</p> <p>Ramsar wetland – Water Park Creek and Nationally important wetland – Dismal Swamp – Water Park Creek. – the works are likely to impact on MNES, a referral under the EPBC Act must be made to DEE.</p> <p>Marine plants are located within the site. Potential impact on marine plants. Removal of marine plants will require an Operational Works permit for the removal, destruction or damage of marine plants under P Act (Shd 3 Table 4 Item 8 of P Reg). May be self-assessable if works can comply with Shd 3 Table 4 item 4 (b) and (d) of the P Reg.</p> <p>Environmental Relevant Activity 16 extracting and screening activities for dredging more than 1000 tonnes of material in a year may be triggered depending on works (P Reg Shd 3, Table 2, Item 1).</p> <p>Operational Works for tidal works or works within a coastal management district is triggered under P Act for the works in the tidal area. Works are self-assessable if the work is mentioned in a code for the self-assessable operational work declared under the CPM Reg to be a code for IDAS (P Reg Shd 3 Part 2, Table 4 Item 8 (b)).</p> <p>FHA A is located in the site area. Building work or operational work in a declared FHA require a development permit under S Act. May be self-assessable if works can comply with Shd 3 Table 1, Item 3 (a) and (d) and Table 4 item 3 (b) and (d) of the P Reg.</p> <p>Category B remnant vegetation, of concern REs 8.3.6c and 8.11.6 and essential habitat. Exemptions apply for clearing native vegetation on land generally that is clearing for the construction or maintenance of community infrastructure mentioned in Shd 2 of P Reg that is government supported transport infrastructure.</p> <p>The works are located within the Rural Zone of the Livingstone Planning Scheme. A landing is exempt development in this zone. A utility installation would require self-assessment against the relevant codes of the planning scheme.</p> <p>The operational works are exempt from assessment against the local planning scheme as the works would be undertaken by or on behalf of a public sector entity (TMR) (Shd 4 Table 4 (1) of P Reg).</p> <p>Reserve tenure.</p>	
Consultation feedback	<p>LSC support concept and priority.</p> <p>Improved ramp design is supported. Floating walkway may be vulnerable to flooding.</p> <p>Sealing of car park is not supported. Sealing of the access road is not an LSC priority.</p> <p>An upgrade of the existing retaining wall supporting the car park would also be supported.</p>	
Indicative cost (excl. GST) (to ±50%)	Water-based infrastructure	\$ 1,460,000
	Land-based infrastructure	\$ 800,000 (unsealed)

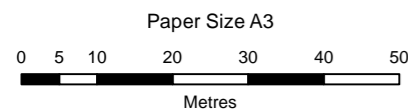


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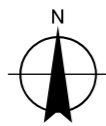


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Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



LEGEND

- Populated Places
- State controlled road
- Cadastre
- Carpark
- Floating Walkway
- Boat Ramp



Department of Transport and Main Roads  
Queensland Recreational Boating Demand Study

Job Number	41-30098
Revision	A
Date	15 Dec 2016

**Boating facility  
Corbetts Landing**

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Data source: GHD: Layout/2016; DNRM: Roads/2015, Populated Places, Local Government Area/2016, Cadastre/2016; TMR: Facilities/2016, Imagery (2013-2016). Created by: AJ/MS/JCM

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## 7.8 Priority 4 sites

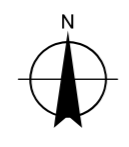
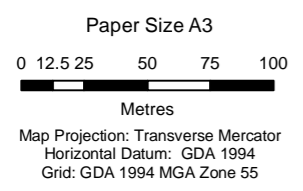
A new 4-lane open-water facility – refer to section 7.9 for potential options.

A new pontoon at a new marina at Causeway Lake or within Rosslyn Bay Boat Harbour.

Table 24 – Priority 4 – Quay St, Rockhampton City

Site name	Quay St, Rockhampton City
Existing formal facility?	No
Location	South bank of the Fitzroy River, on Quay Street at the intersection with William Street
Current tidal status	All-tide, distance-limited open-water access
Proposed works	Pontoon for access by deep-draught vessels.
Increase in effective lanes provided by works	Nil
Rationale	<p>This section of river is a popular anchorage. The site is currently overflow city parking along the riverbank and directly adjoins the central business district of Rockhampton. This section of riverfront public land is the next section to undergo revitalisation, and inclusion of a pontoon to improve accessibility for deep draught vessels would complement this area. The nearby Derby St facility is a fixed jetty, with limited accessibility; a pontoon would better cater to demand.</p> <p>Council has suggested that this should be a Priority 2 site on the basis that the existing Derby St jetty does not comply with accessibility standards, and that there is a tourism opportunity for non-trailer vessels to harbour in the Fitzroy River and access various retail and food shops thus increasing economic impact for the Rockhampton region.</p>

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- LEGEND**
- Populated Places
  - State controlled road
  - Cadastre



Department of Transport and Main Roads  
Queensland Recreational Boating Demand Study

Job Number 41-30098  
Revision A  
Date 16 Dec 2016

**Boating facility  
Quay Street, Rockhampton**

## 7.9 Options for new open-water facilities on the Capricorn Coast

To meet future demand for all-tide access to open water within the Livingstone – Rockhampton region, additional recreational boating facilities will be required. Given the limited opportunities to expand existing facilities to achieve this, a preliminary assessment of potential sites identified the following Capricorn Coast locations as worthy of further investigation (listed from north to south).

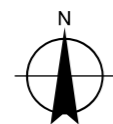
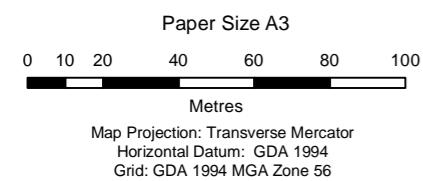
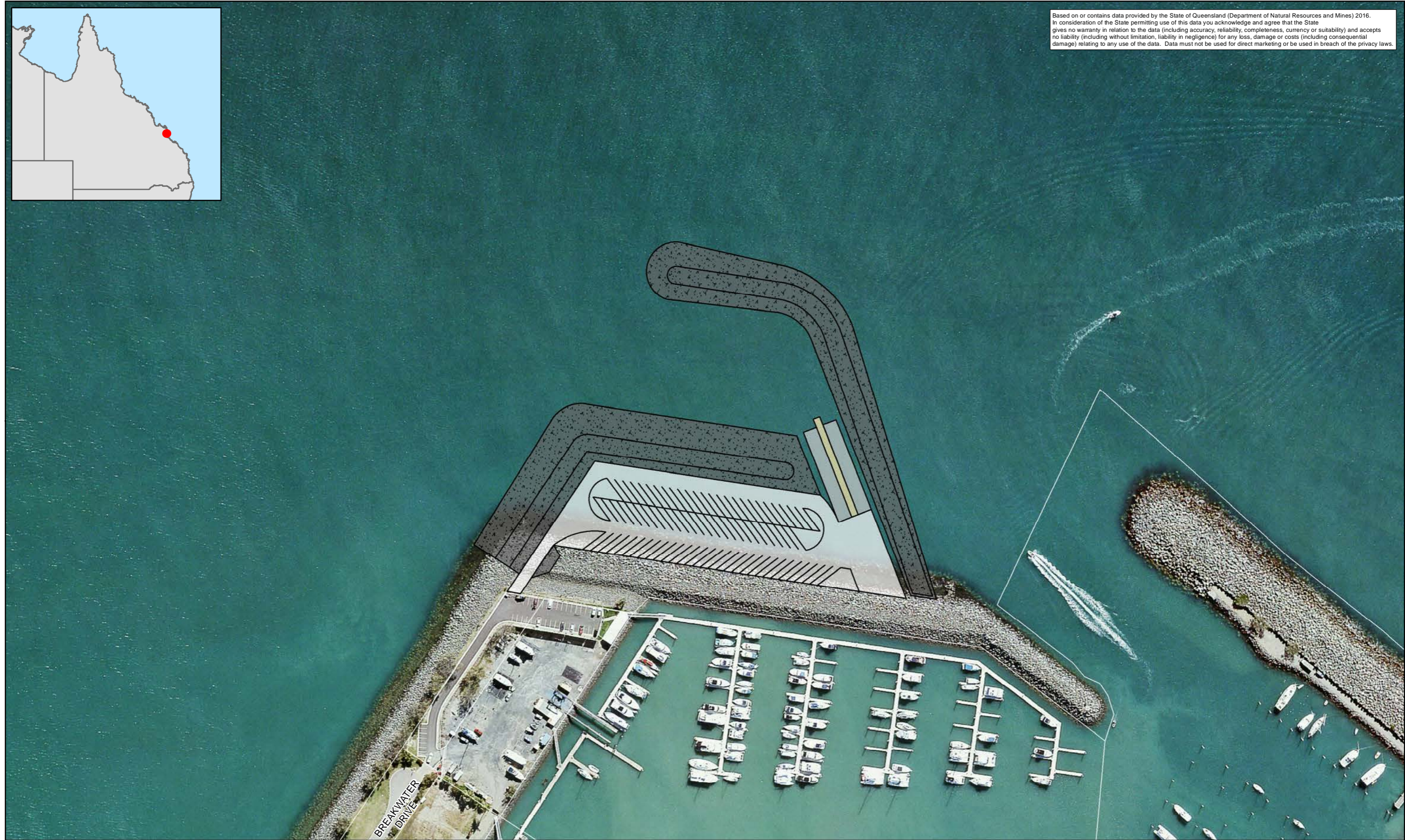
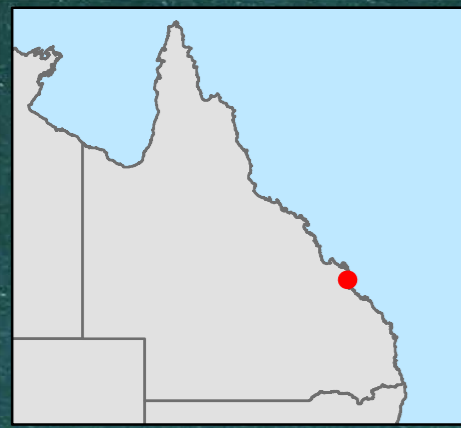
Table 25 – Option A – Rosslyn Bay Boat Harbour expansion

Site name	Rosslyn Bay Boat Harbour expansion
Existing formal facility?	Yes
Location	Rosslyn Bay Boat Harbour, Vin E Memorial Drive, Rosslyn
Current tidal status	All-tide, open-water access
Site characteristics	<p>Rosslyn Bay Boat Harbour is a state boat harbour, located just under three nautical miles south-east of Yeppoon. Public facilities in the harbour consist of two boat ramps, each comprising 4-lanes with a floating walkway, and three jetties that act as deep-draught landings. The depth of the harbour is maintained to provide all-tide access. 241 CTU spaces are provided in total for the two boat ramps.</p> <p>The Coast Guard is located within the harbour, as well as a number of private developments, including marina facilities, fuel facilities, charter and cruise businesses and seafood sales.</p> <p>Entry to and exit from the harbour is via Vin E Jones Memorial Drive. The site is constrained to the north-east and south by the Capricorn Coast National Park.</p>
Proposed works	<p>Expansion of the harbour to accommodate at least one 4-lane ramp with a floating walkway and 90 CTU spaces. Works include extending existing breakwaters close to the harbour entrance to increase the sheltered water area, and land reclamation for parking. Initial and maintenance dredging will be required.</p> <p>Widening of Vin E Jones Memorial Drive to improve vehicle flows around the harbour and reduce congestion during busy periods may be required to support the new ramp. Widening of the road may impact marginally on the adjacent Capricorn Coast National Park – most likely affecting a strip of lower value regrowth scrub. The intersection of this road with Scenic Highway may also need upgrading.</p>
Increase in effective lanes provided by works	4 effective lanes
Rationale	<p>Capricorn Coast facilities providing all-tide recreational boating access to open-water are under pressure. This pressure is anticipated to continue to increase into the future, and options for new facilities at greenfield sites on the coast are limited.</p> <p>Expansion of the harbour would provide additional space to accommodate a new boat ramp and reclaimed land for CTU parking. This would reduce pressure on already congested existing facilities within the harbour. Additional land area created through reclamation works could also potentially support commercial development opportunities.</p> <p>Maintenance dredging of Rosslyn Bay already occurs. As such, costs relating to the mobilisation of dredging equipment would be captured by existing maintenance of the harbour.</p>

Site name	Rosslyn Bay Boat Harbour expansion
	<p>Although environmental approvals may be difficult to obtain, expansion of an existing disturbed site is anticipated to be more favourable than disturbance of a greenfield site.</p> <p>Complementary road improvement works to improve access to the harbour and reduce vehicular congestion issues are desirable.</p>
Environmental and planning constraints	<p>ILUA area; DATSIP Cultural Heritage Database search recommended. TMR to undertake negotiations with registered traditional owners of the land to prepare and execute a CHMP for the works.</p> <p>World and National Heritage Place – Great Barrier Reef Marine Park is within 1 km of the site, Yeppoon – Keppel Sands Tidal Wetlands is a nationally important wetlands – Wetlands - the works are likely to impact on MNES, a referral under the EPBC Act must be made to DEE.</p> <p>Category X vegetation. The area is previously disturbed and impacts are unlikely.</p> <p>Within flora survey trigger mapping area. Impact unlikely. TMR's 'Species Management Program for Tampering with Animal Breeding Places' and 'Protected plant exemption' agreement may apply depending on works.</p> <p>If clearing is to be undertaken within the road reserve and if it is undertaken by TMR, an NC Act clearing permit will not be required. If clearing is to occur outside of the road reserve, an NC Act clearing permit will be required.</p> <p>Marine plants may be located within the site. Removal of marine plants will require an Operational Works permit for the removal, destruction or damage of marine plants under P Act (Shd 10 Part 17 Item 28 of P Reg). May be accepted development if works can comply with the requirements under Shd 7 Item 8 of the P Reg.</p> <p>Environmental Relevant Activity 16 extracting and screening activities for dredging more than 1000 tonnes of material in a year may be triggered depending on works (P Reg Shd 10, Part 5, Div 2, Item 1).</p> <p>Operational Works for tidal works or works within a coastal management district is triggered under P Act for the works in the tidal area. Works are considered accepted development under the P Reg Shd 7 Part 3, Item 10 (b) for tidal works that is undertaken by TMR. Accepted development works are to comply with the requirements for the work prescribed under the Coastal Act, Section 167(5)(b).</p> <p>No FHA is located on site. No development permit for building work or operational work in a declared FHA is required.</p> <p>The works are located within the Business Zone of the Livingstone Planning Scheme. A local utility is accepted development if it can meet the requirements under the Business Zone Code, otherwise it becomes code assessable.</p> <p>The operational works are exempt from assessment against the local planning scheme as the works would be undertaken by or on behalf of a public sector entity (TMR) (Shd 6 Part 3, Section 8 of P Reg).</p>

Site name	Rosslyn Bay Boat Harbour expansion	
Consultation feedback	<p>Additional all-tide facilities are needed on the Capricorn Coast in the wake of abandonment of the proposal for a new boat ramp at Emu Park.</p> <p>LSC supports improved operational efficiencies at Rosslyn Bay. Further investigation of the immediate, staged and ultimate development options for this site are required to inform a strategic comparison with other sites.</p>	
Indicative cost (excl. GST) (to ±50%)	Water-based infrastructure (including 10 years maintenance dredging)	\$ 8,330,000
	Land-based infrastructure (including revetment)	\$ 10,270,000

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LEGEND

- Populated Places
- Breakwater/Revetment
- Floating Walkway
- State controlled road
- Carpark
- Boat Ramp
- Cadastre



Department of Transport and Main Roads  
Queensland Recreational Boating Demand Study

Job Number | 41-30098  
Revision | A  
Date | 01 Aug 2017

**Boating facility  
Rosslyn Bay Boat Harbour Extension**

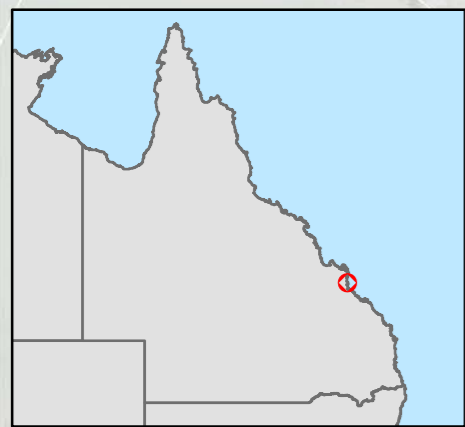
Table 26 – Option B – Scenic Highway, Causeway Lake

Site name	Scenic Highway, Causeway Lake
Existing formal facility?	No
Location	Beach area immediately south of the mouth of Causeway Lake (Mulambin Creek/Shoal Creek)
Current tidal status	Part-tide, depth-limited open-water access
Site characteristics	<p>This site is located on the open coast approximately 4km south of Rosslyn Bay. It currently comprises areas of sand dune, beach and inter-tidal flats that have been stabilised by the construction of the causeway across the mouth of Shoal Creek in the 1930's. Prior to this time, the area would have intermittently been the meandering channels at the mouth of Mulambin/Shoal Creek.</p> <p>The nearshore area at the creek mouth is shallow, but is largely protected from north-easterly waves by the headland at the southern end of Mulambin Beach (Pinnacle Point). The 500m wide inter-tidal flat extends seaward of Pinnacle Point, nearly reaching Creek Rock. As the shoreline is east-facing, this area is exposed to easterly and south-easterly winds and waves, with the area east of Pinnacle Point also exposed to north-easterly winds and waves.</p> <p>Detailed site investigations would be required to confirm the suitability of the site for a significant all-tide sheltered recreational boating facility.</p> <p>The dune area is well vegetated and mangroves have colonised in the inter-tidal zone close to the causeway opening.</p> <p>The area is popular with beach goers who recreate in the lake and on the oceanfront.</p>
Proposed works	<p>Creation of a major boating facility within a protected harbour, comprising at least a 4-lane boat ramp with a floating walkway and a public pontoon, and 90 CTU spaces.</p> <p>The harbour would require wave protection structures, reclamation and dredging (capital and maintenance). The concept layout provided seeks to identify the key harbour components necessary to support a recreational boating facility. These are:</p> <ul style="list-style-type: none"> <li>- Balancing reclamation and dredging extents to most economically provide/reach navigable waters (approx. 2.5m below LAT), reduce maintenance dredging requirements and create land for harbour infrastructure such as chandleries, marina offices and parking.</li> <li>- Seawalls and breakwaters to protect the reclamation from wave erosion and shelter vessels entering the harbour from north-east, east and south-easterly waves.</li> </ul> <p>Optimising the design to manage the sedimentation issues associated with Causeway Lake is more complex, and would need to be the subject of extensive further investigation. The creation of a northern breakwater for a harbour will trap southward travelling sand, which will need to be manually bypassed around the harbour towards Kinka Beach to maintain natural beach processes. This means that dredging of some form would be required on both sides of the breakwater, as periodic dredging will be required on the southern side for navigation.</p> <p>The breakwater could be positioned on the natural submerged tombolo between Pinnacle Point and Creek Rock, with Causeway Lake flows directed into the harbour. This would significantly reduce construction costs due to</p>

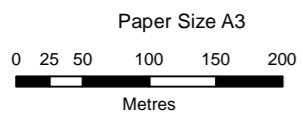
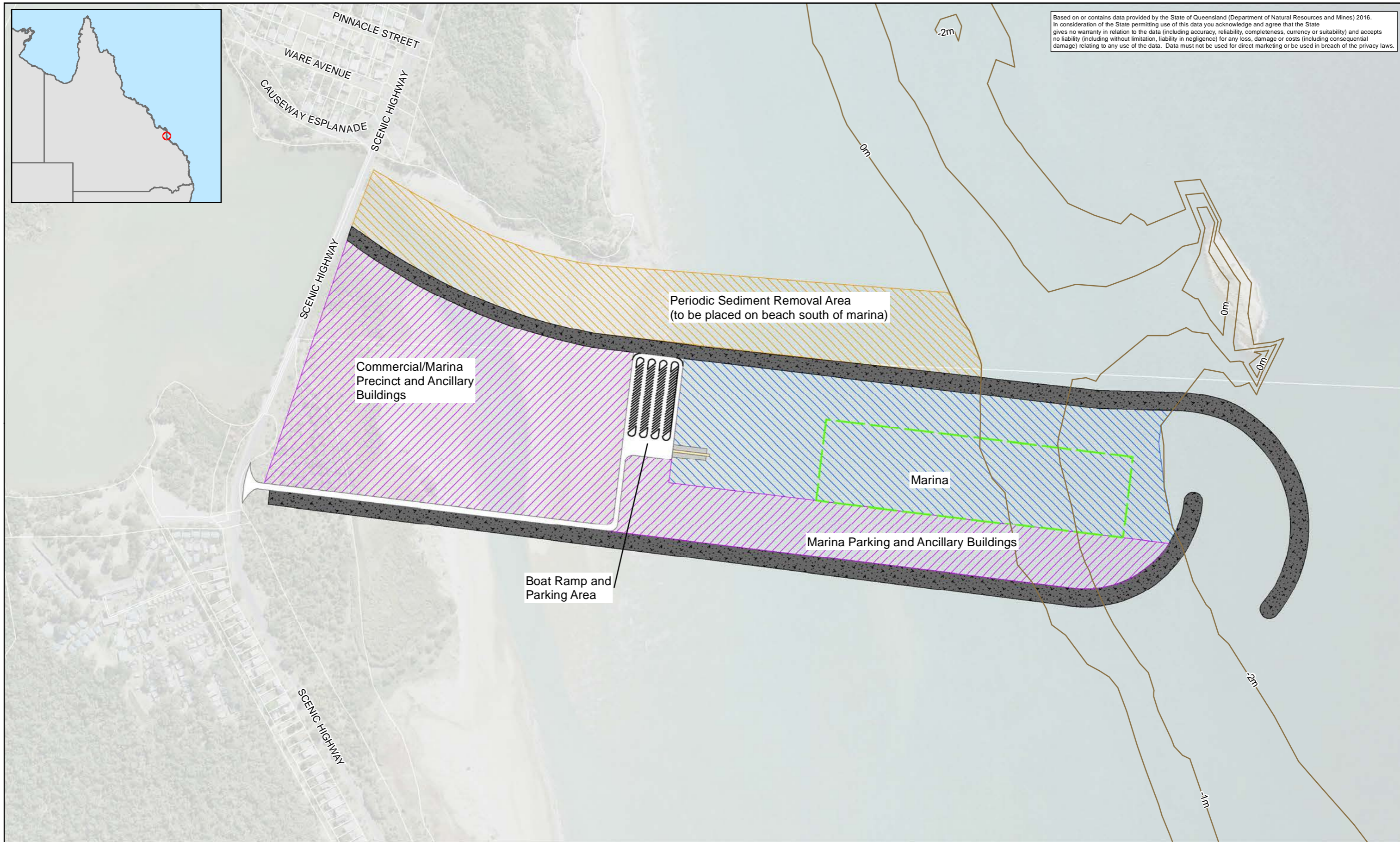


Site name	Scenic Highway, Causeway Lake
	<p>reduced rock quantities. However, flood flows and debris would be forced into the Harbour, potentially damaging infrastructure and vessels within, and depositing large amounts of silt and other sediments into the harbour which would need to be manually removed after each flood event.</p> <p>Keeping the northern breakwater separate to Pinnacle Point avoids this issue, and promotes natural relocation of accumulated beach sediments to the nearshore area where natural beach processes and sand bypassing can resume.</p> <p>In addition, the headland around Pinnacle Point forms part of the Capricorn Coast National Park. Connecting Pinnacle Point to Creek Rock with a breakwater is anticipated to raise significant environmental and visual amenity concerns within the community.</p>
Increase in effective lanes provided by works	4 effective lanes
Rationale	<p>Capricorn Coast facilities providing all-tide recreational boating access to open-water are under pressure. This pressure is anticipated to continue to increase into the future, and options for new facilities at greenfield sites on the coast are limited.</p> <p>Causeway Lake has been undergoing progressive deterioration in water quality due to siltation and nutrient loads, and also due to the artificial environment created by the construction of the causeway. Routine dredging immediately downstream of the causeway would assist in reducing the flow of beach sands into the lake on high tides. However, this dredging could be extended to create a harbour that provides a sheltered site for boat launching and retrieval, with opportunities for a privately funded marina.</p> <p>Creation of a marina in this location would also eliminate erosion due to channel meandering at Kinka Beach. Periodic sand replenishment at Kinka Beach could be delivered using clean beach sands removed during maintenance dredging works.</p> <p>A facility in this location could service demand from the Emu Park area, and is marginally closer than Rosslyn Bay for Rockhampton residents. It is located close to the popular offshore destination of Great Keppel Island.</p> <p>The establishment of a marina facility in this location would require substantial community consultation, environmental investigations and approvals for capital and maintenance works, and public and private investment for viability.</p>
Environmental and planning constraints	<p>ILUA area; DATSIP Cultural Heritage Database search recommended. TMR to undertake negotiations with registered traditional owners of the land to prepare and execute a CHMP for the works.</p> <p>The Great Barrier Reef and Yeppoon – Keppel Sands Tidal Wetlands (Nationally Important Wetlands) – the works are likely to impact on MNES, a referral under the EPBC Act must be made to DEE.</p> <p>Category B remnant vegetation, of concern RE 11.2.2b and least concern RE 11.1.4b. Exemptions apply for clearing native vegetation on land generally that is clearing for the construction or maintenance of community infrastructure mentioned in Shd 21, Part 1, Section 14 (b) of P Reg that is government supported transport infrastructure.</p> <p>Not within a flora trigger mapping area.</p>

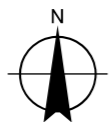
Site name	Scenic Highway, Causeway Lake	
	<p>Marine plants may be located within the site. Removal of marine plants will require an Operational Works permit for the removal, destruction or damage of marine plants under P Act (Shd 10 Part 17 Item 28 of P Reg). May be accepted development if works can comply with the requirements under Shd 7 Item 8 of the P Reg.</p> <p>Environmental Relevant Activity 16 extracting and screening activities for dredging more than 1000 tonnes of material in a year may be triggered depending on works (P Reg Shd 10, Part 5, Div 2, Item 1).</p> <p>Operational Works for tidal works or works within a coastal management district is triggered under P Act for the works in the tidal area. Works are considered accepted development under the P Reg Shd 7 Part 3, Item 10 (b) for tidal works that is undertaken by TMR. Accepted development works are to comply with the requirements for the work prescribed under the Coastal Act, Section 167(5)(b).</p> <p>No FHA is located on site. No development permit for building work or operational work in a declared FHA is required.</p> <p>The works are located within the Open Space Zone of the Livingstone Planning Scheme. A local utility is accepted development if it can meet the requirements under the Open Space Zone Code, otherwise it becomes code assessable. A utility installation would require self-assessment against the relevant codes of the planning scheme.</p> <p>The operational works are exempt from assessment against the local planning scheme as the works would be undertaken by or on behalf of a public sector entity (TMR) (Shd 6 Part 3, Section 8 of P Reg).</p>	
Consultation feedback	<p>LSC supports the principle of staged and scalable development at this site. Further investigation of the development options for this site are required to inform a strategic comparison with other sites.</p> <p>Further investigation needed into optimum positions of major infrastructure (including breakwaters and channel design), opportunities for soft engineering works, and resolution of land tenure.</p>	
Indicative cost (excl. GST) (to ±50%) Excludes all marina and ancillary structures	Water-based infrastructure (Includes breakwaters and 10 years maintenance dredging)	\$ 97,000,000
	Land-based infrastructure (Includes pavement for CTU parking and access road only. Assumes approx. 40% of reclamation fill sourced from capital dredging)	\$ 29,000,000



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Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56



LEGEND

- Populated Places
- Contour (1m LAT)
- State controlled road
- Breakwater
- Carpark
- Floating Walkway
- Boat Ramp
- Infill/Reclamation Area
- Marina
- Dredging Area
- Periodic Sediment Removal Area
- Cadastre



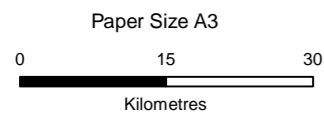
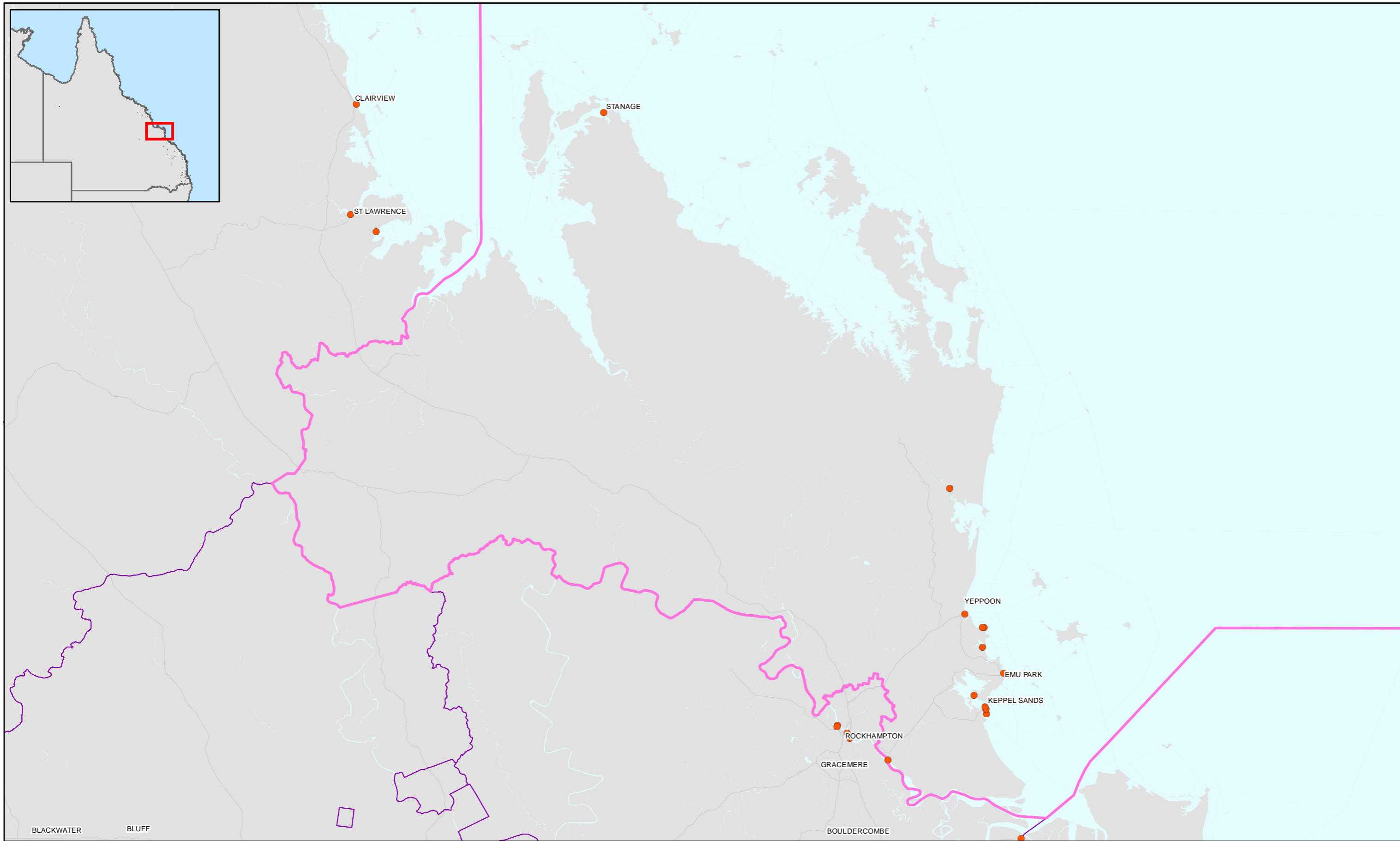
Department of Transport and Main Roads  
Queensland Recreational Boating Demand Study

Job Number | 41-30098  
Revision | B  
Date | 31 Oct 2017

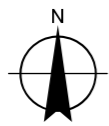
Boating facility  
Causeway Lake

# Appendices

# Appendix A – Locality plan, existing facilities



Horizontal Datum: GDA 1994  
Grid: GCS GDA 1994



**LEGEND**

- Boating Facility
- Water
- State controlled road
- Local Government Area

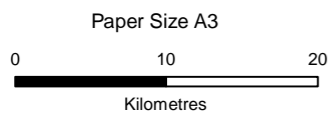
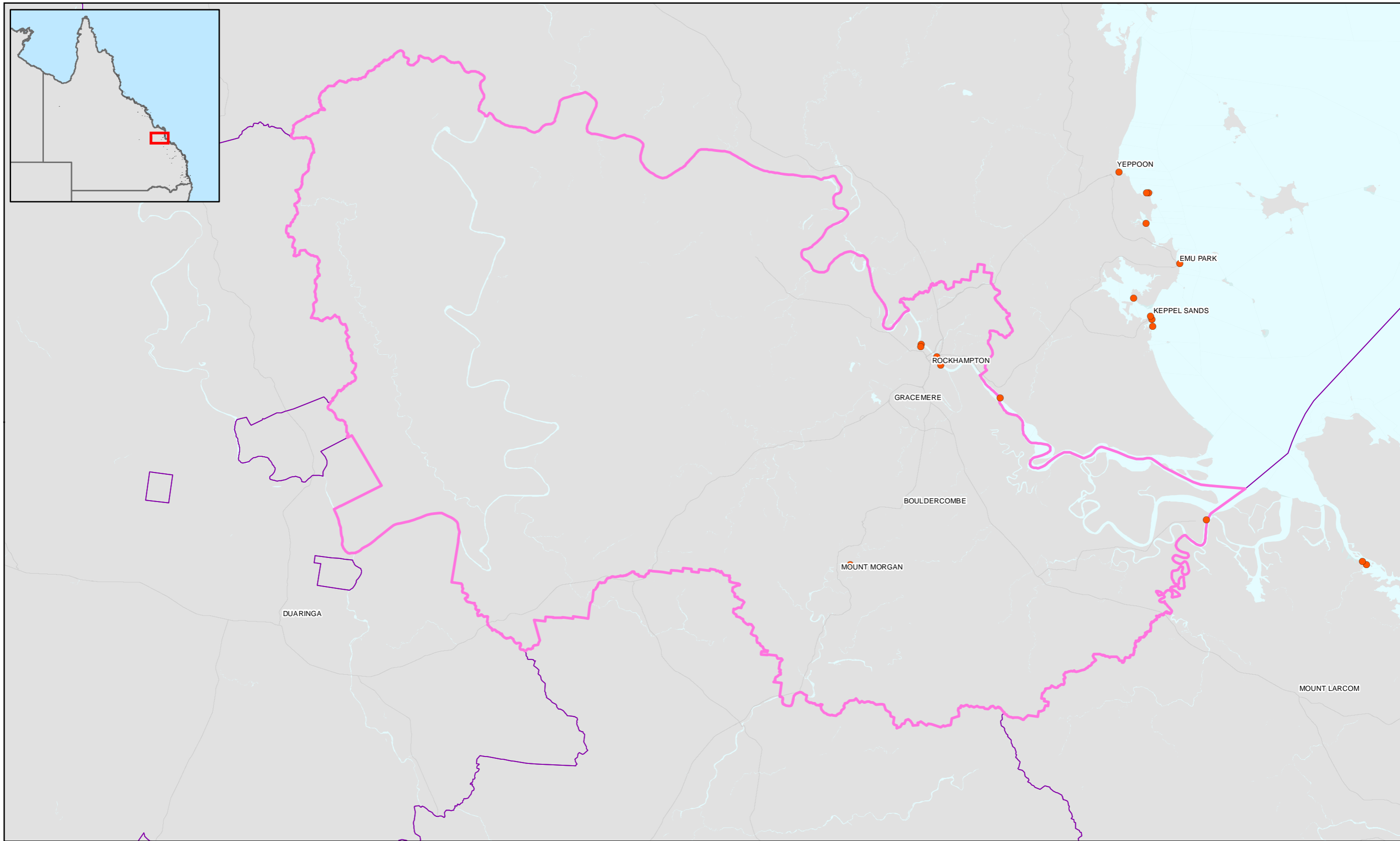
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Job Number	41-30098
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Date	20 Dec 2016

Livingstone Shire Council



Horizontal Datum: GDA 1994  
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**LEGEND**

- Boating Facility
- Water
- State controlled road
- Local Government Area

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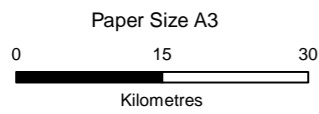
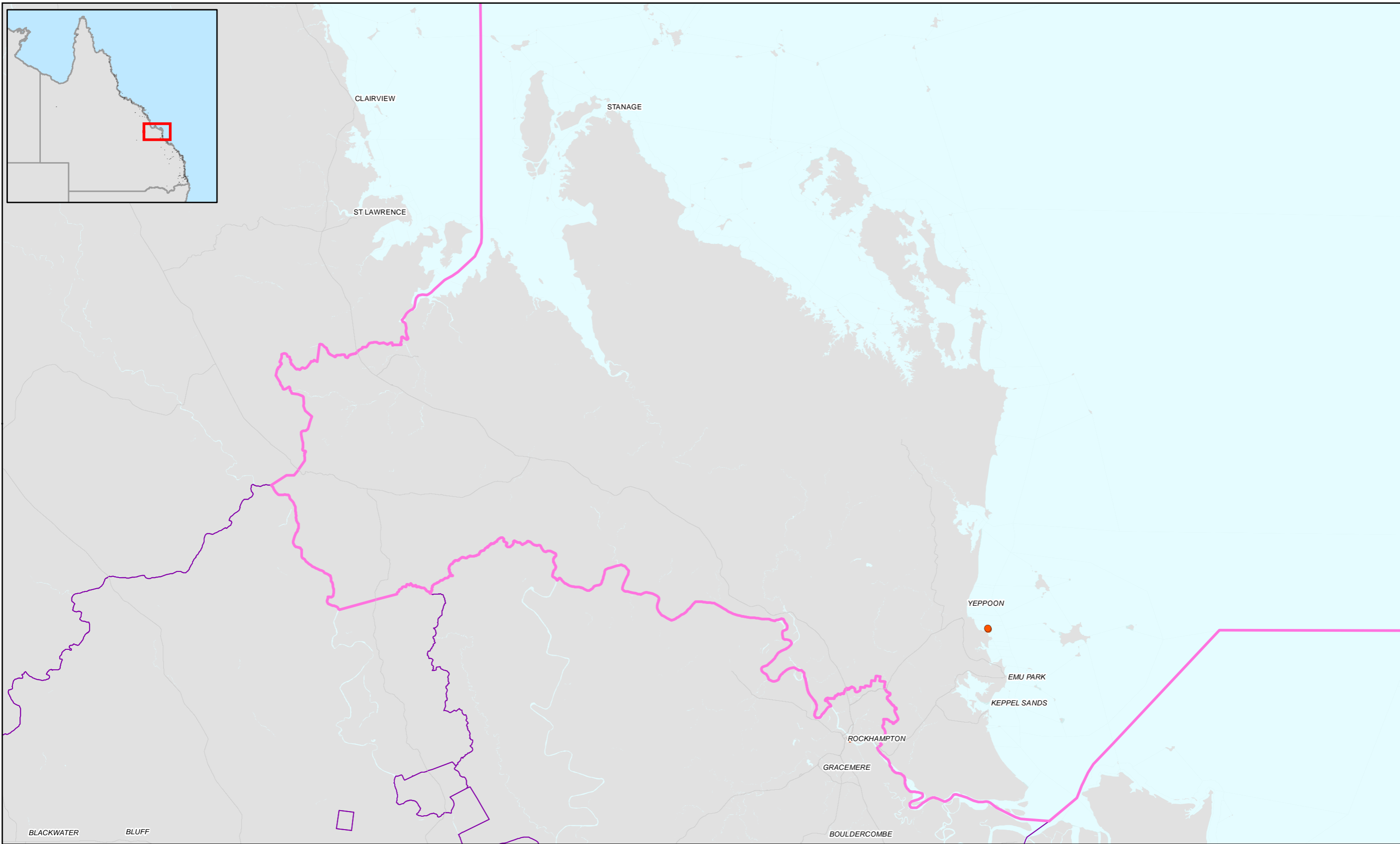


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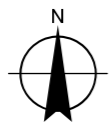
Job Number	41-30098
Revision	C
Date	20 Dec 2016

Rockhampton Regional Council

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Horizontal Datum: GDA 1994  
Grid: GCS GDA 1994



**LEGEND**

- Deep-draught/tender landing
- State controlled road
- Local Government Area
- Water

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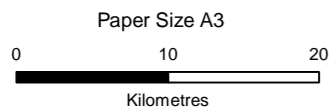
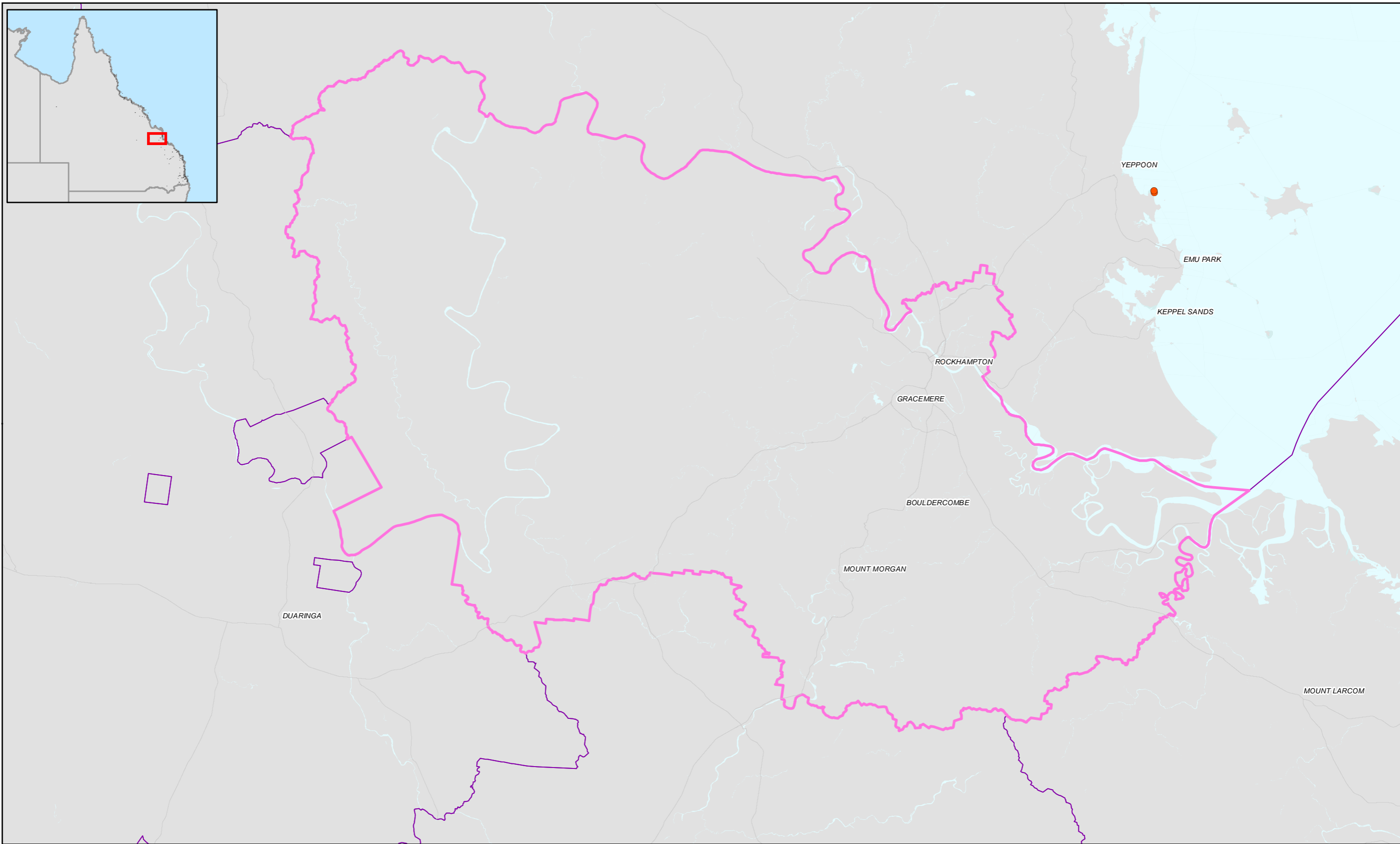


Department of Transport and Main Roads  
Queensland Recreational Boating Demand Study

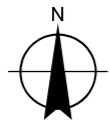
Job Number	41-30098
Revision	C
Date	21 Dec 2016

Livingstone Shire Council





Horizontal Datum: GDA 1994  
Grid: GCS GDA 1994



**LEGEND**

- Deep-draught/tender landing
- Water
- State controlled road
- Local Government Area

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Department of Transport and Main Roads  
Queensland Recreational Boating Demand Study

Job Number	41-30098
Revision	C
Date	21 Dec 2016

Rockhampton Regional Council

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# Appendix B – Capacity assessment, existing facilities

Facility ID / LGA	Facility name	Tidal access (at ramp)	# Existing lanes	Queuing facility	Effective lanes after tidal access adjustment	# CTU	Effective lanes after adjustment for tidal access, queuing facility and # CTUs		Constraint	Comment
							Waterside	CTU		
<b>Open-water access</b>										
LV71 / LSC	East Ramp, Anchor Drive, Rosslyn Bay	All-tide	4	Floating walkway	4	135	6	6	Waterside	241 CTU total
LV73 / LSC	West Ramp, Breakwater Drive, Rosslyn Bay	All-tide	4	Floating walkway	4	106	6	5	CTU	
FY12 / RRC	Port Alma Road, Port Alma	All-tide	2	No	2	Unformed	2	Unformed	Waterside	
LV16 / LSC	Taylor Street, Keppel Sands	Part-tide	1	No	0.5	Unformed	0.5	Unformed	Waterside	
	<b>SUBTOTAL</b>		<b>11</b>		<b>10.5</b>		<b>14.5</b>	<b>11*</b>		
<b>Depth-limited open-water access</b>										
LV21 / LSC	Svensden Road, Coorooman Creek	Near all-tide	4	Floating walkway	3.2	93	4.8	4	CTU	
LV11 / LSC	Limpus Avenue Upstream, Keppel Sands	Part-tide	1	No	0.5	Nil	0.5	0	CTU	
LV15 / LSC	Limpus Avenue Downstream, Keppel Sands	Part-tide	1	No	0.5	6	0.5	0.5	Waterside	
LV66 / LSC	Corbetts Landing Road, Corbetts Landing	Part-tide	1	No	0.5	Unformed	0.5	Unformed	Waterside	
	<b>SUBTOTAL</b>		<b>7</b>		<b>4.7</b>		<b>6.3</b>	<b>4.5*</b>		
<b>Distance-limited open-water access</b>										
LV12 / LSC	St Christopher's Chapel Road, Nerimbera	All-tide	4	No	4	Unformed	4	1.5	CTU	
RK32 / RRC	Quay Street, Rockhampton	All-tide	3	Floating walkway	3	9	4.5	0.5	CTU	
RK15 / RRC	Robert Clark Drive, Callaghan Park, North Rockhampton**	All-tide	4	Floating walkway	4	45	6	4	CTU	45 sealed CTU spaces + unsealed for 45 CTU

Facility ID / LGA	Facility name	Tidal access (at ramp)	# Existing lanes	Queuing facility	Effective lanes after tidal access adjustment	# CTU	Effective lanes after adjustment for tidal access, queuing facility and # CTUs		Constraint	Comment	
							Waterside	CTU			
RK11 / RRC	Reaney Street, Rockhampton	Part-tide	1	No	0.5	15	0.5	1	Waterside		
	<b>SUBTOTAL</b>		<b>12</b>		<b>11.5</b>		<b>15</b>	<b>7*</b>			
	<b>Beach ramps</b>										
LV31 / LSC	Hill Street, Emu Park	Part-tide	1	Beach	0.5	16	0.5	1	Waterside		
LV61 / LSC	Emu Park Road, Yeppoon, Fig Tree Creek	Part-tide	1	No	0.5	7	0.5	0.5	Waterside		
LV67 / LSC	Banksia Road, Stanage Bay	Part-tide	2	No	1	15	1	1	Waterside		
	<b>SUBTOTAL</b>		<b>4</b>		<b>2</b>		<b>2</b>	<b>2.5</b>			
	<b>No open-water access</b>										
LV41 / LSC	Resada Esplanade, Causeway Lake	Near all-tide	1	Beach	0.8	Unformed	0.8	Unformed	Waterside		
MM10 / RCC	Dee River, Mount Morgan	Fresh water	1	No	1	Unmarked	1	Unmarked	Waterside		
RK21 / RCC	Larcombe Street, Rockhampton	Fresh water	1	No	1	Unmarked	1	Unmarked	Waterside		
RK31 / RCC	Ski Gardens, Rockhampton	Fresh water	1	No	1	Unmarked	1	Unmarked	Waterside		
	<b>SUBTOTAL</b>		<b>4</b>		<b>3.8</b>		<b>3.8</b>	<b>0*</b>			
			<b>Total effective capacity</b>					<b>30.8*</b>			

\*CTU calculation does not include unformed or unmarked parking spaces.

\*The effective capacity of each facility is shaded.

\*\*Facility under construction at time of writing (October 2017).

# Appendix C – Demand assessment (Economic Associates)

# Recreational Boating Facilities Demand Forecasting Study - 2016 Census Update

## Final Report

December 2017



**ECONOMIC ASSOCIATES**

# Recreational Boating Facilities Demand Forecasting Study - 2016 Census Update

## Final Report

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December 2017

16042

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# 1 INTRODUCTION

## 1.1 Purpose of study

Economic Associates (as a sub consultant to GHD Pty Ltd) were engaged by the Department of Transport and Main Roads (TMR) to undertake an assessment of the demand for recreational boating facilities at the local government area (LGA) level. Demand projections have been prepared at five year intervals to 2036 (that is, 2016, 2021, 2026, 2031 and 2036) and take into account current and future demand for recreational boat ramps and landings.

This study represents an update to the *Recreational Boating Facilities Demand Forecasting Study 2016*, taking into account 2016 Census data.

## 1.2 Report structure

The report has been structured as follows:

- Section 1: Introduction: Provides an outline of the purpose of the study and report structure
- Section 2: Projected size of recreational boating fleet: Provides an overview of the assumptions utilised in preparing estimates of the projected recreational boating fleet by LGA
- Section 3: Infrastructure demand assessment: Provides an overview of the assumptions utilised in preparing estimates of the demand for new or upgraded boat ramps and landings by LGA
- Section 4: References: Provides a summary of the references utilised in preparing this report.

## 1.3 Disclaimer

This report is based on the most up to date readily available information. Sources are documented in the report. Economic Associates has applied due professional care and diligence in accordance with generally accepted standards of professional practice in undertaking analysis and interpretation of source information. Economic Associates is not liable for damages arising from any errors or omissions arising from use of these information sources.

As this report involves future projections which can be affected by a number of unforeseen circumstances, it represent our best possible estimates and no warranty is given that these particular projections will eventuate.

## 2 PROJECTED SIZE OF RECREATIONAL BOATING FLEET

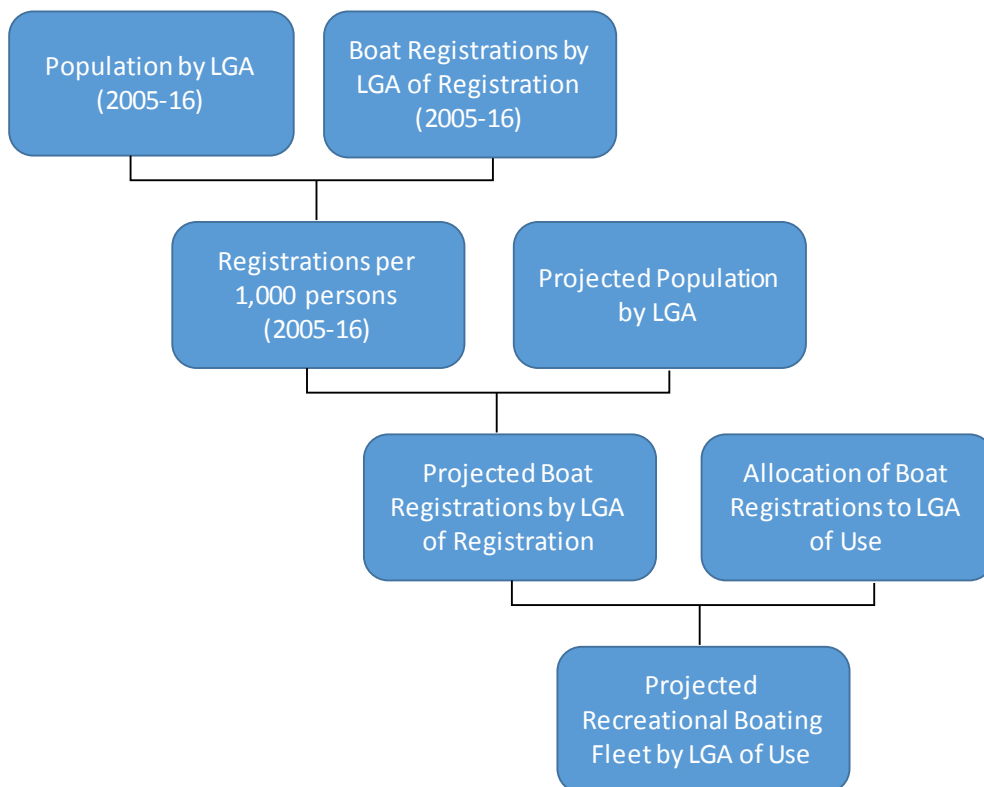
This section of the report provides a summary of the projected size of the recreational boating fleet by LGA, including a detailed explanation relating to the assumptions made in preparing the projections.

### 2.1 Methodology

In estimating the projected size of the recreational boating fleet, the assessment has made a number of assumptions relating to the current and projected size of the trailable and non-trailable fleet and the relationship between LGA of registration and LGA of waterway/facility use.

Figure 2.1 below outlines the methodology utilised in preparing the projected size of the recreational boating fleet by LGA of use.

**Figure 2.1: Methodology utilised in projecting recreational boating fleet by LGA of use**



## 2.2 Assumptions

### 2.2.1 Current size of recreational boating fleet

TMR provided data relating to historical boat registrations for the 2005 to 2016 period for the following categories:

- sail boats
- boats without sails, including:
  - motor boats without sails
  - speed boats
  - jet skis (or personal watercraft).

The data was provided by LGA of registration. This data was used to generate historical estimates of the size of the trailable and non-trailable boat fleet for each LGA, including the following sub-categories:

- trailable fleet, which comprises the following sub-categories:
  - boats up to 4.5 metres in length (including jet skis)
  - boats 4.5 – 8 metres in length
- non-trailable fleet (vessels most likely to be berthed at marinas or private moorings).

The trailable boat fleet has been estimated for two sub-classes to identify vessels that tend to be used inshore (vessels up to 4.5 metres in length) versus vessels which have the ability to travel offshore (vessels 4.5 – 8 metres in length). The 4.5 metre cut-off length was identified through consultation with LGA and port/water storage officers undertaken by GHD as part of this study, and confirmed by TMR officers as being reasonable and accepted for intended uses of the study.

Table 2.1 below summarises our assumptions in relation to the split of trailable boats and non-trailable boats based on the data provided by TMR. This assessment assumes that all boats greater than eight metres in length are non-trailable and that all jet skis are within the trailable boat fleet.

The incidence of trailable and non-trailable boats eight metres or less in length is consistent with the assumptions made in the *Recreational Boating Facilities Demand Forecasting Study 2011*.

**Table 2.1: Estimated proportion of trailable and non-trailable boats, 2005-2016**

Length	Trailable		Non-trailable	
	sail boats	Boats without sail	Sail boats	Boats without sail
<3 metres	100.0%	100.0%	0.0%	0.0%
3-5 metres	90.0%	100.0%	10.0%	0.0%
5-8 metres	50.0%	85.0%	50.0%	15.0%
8-10 metres	0.0%	0.0%	100.0%	100.0%
10-12 metres	0.0%	0.0%	100.0%	100.0%
12-15 metres	0.0%	0.0%	100.0%	100.0%
15-25 metres	0.0%	0.0%	100.0%	100.0%
>25 metres	0.0%	0.0%	100.0%	100.0%

Source: Economic Associates estimates

In 2016, there were 996 vessel registrations that were not assigned to an LGA in Queensland<sup>1</sup>, comprising 983 interstate registrations, five overseas registrations and eight unknown registrations. For this assessment, the following assumptions have been made for the allocation of these registrations to the trailable and non-trailable boat fleets:

- *Interstate registrations:* Interstate registrations have been allocated in the manner outlined in Table 2.1 above, as it is considered likely that the majority of interstate registrations of a trailable length are within northern NSW.
- *Overseas and unknown registrations:* The assessment has assumed that all overseas and unknown registrations are of a non-trailable nature.

Based on the assumptions presented in Table 2.1 above and the allocation of interstate, overseas and unknown registrations, the estimated size of the recreational boating fleet in Queensland was 279,586 vessels in 2016, comprising:

- 184,835 trailable boats up to 4.5 metres in length (including jet skis)
- 73,462 trailable boats 4.5 – 8 metres in length
- 21,289 non-trailable boats.

Not surprisingly, the size of the recreational boating fleet was highest in a number of South-east Queensland councils, Mackay Regional Council, Townsville City Council, and Cairns Regional Council.

Table 2.2 below presents the estimated size of the recreational boating fleet in Queensland and each of the component LGAs in 2016.

**Table 2.2: Estimated size of recreational boating fleet by LGA, Queensland, 2016**

LGA of registration	Trailable		Non-trailable	Total
	Up to 4.5m	4.5-8m		
Aurukun (S)	9	9	0	18
Balonne (S)	229	93	14	336
Banana (S)	928	371	54	1,353
Barcaldine (R)	120	46	6	172
Barcoo (S)	22	7	2	31
Blackall-Tambo (R)	73	24	3	100
Boulia (S)	11	2	0	13
Brisbane (C)	18,600	7,539	3,009	29,148
Bulloo (S)	10	2	0	12
Bundaberg (R)	7,483	1,711	418	9,612
Burdekin (S)	2,560	887	123	3,570
Burke (S)	34	14	2	50
Cairns (R)	6,650	3,584	996	11,229
Carpentaria (S)	148	79	14	241
Cassowary Coast (R)	2,718	1,576	298	4,592
Central Highlands (R)	1,507	720	120	2,347
Charters Towers (R)	524	170	23	717
Cherbourg (S)	0	1	0	1
Cloncurry (S)	125	55	6	186
Cook (S)	304	177	67	548
Croydon (S)	11	4	0	15
Diamantina (S)	6	0	1	7

<sup>1</sup> The 996 vessel registrations not registered in an LGA in Queensland accounted for less than 0.4% of the total recreational fleet in 2016.

LGA of registration	Trailable		Non-trailable	Total
	Up to 4.5m	4.5-8m		
Doomadgee (S)	2	2	0	4
Douglas (S)	908	664	175	1,747
Etheridge (S)	38	12	1	51
Flinders (S)	83	30	7	120
Fraser Coast (R)	7,252	2,902	821	10,975
Gladstone (R)	5,148	2,435	538	8,121
Gold Coast (C)	24,407	8,121	3,739	36,266
Goondiwindi (R)	659	202	25	886
Gympie (R)	2,656	937	235	3,828
Hinchinbrook (S)	1,428	635	118	2,180
Hope Vale (S)	17	14	4	35
Ipswich (C)	4,537	1,630	282	6,449
Isaac (R)	1,381	611	111	2,103
Kowanyama (S)	8	1	0	9
Livingstone (S)	2,821	1,507	504	4,831
Lockhart River (S)	7	5	4	16
Lockyer Valley (R)	1,285	461	78	1,824
Logan (C)	8,691	3,593	789	13,074
Longreach (R)	191	59	7	257
Mackay (R)	9,909	3,515	814	14,238
McKinlay (S)	48	21	4	73
Mapoon (S)	8	5	0	13
Maranoa (R)	544	180	22	746
Mareeba (S)	838	353	79	1,270
Moreton Bay (R)	16,249	5,992	1,637	23,878
Mornington (S)	16	13	2	31
Mount Isa (C)	700	402	43	1,145
Murweh (S)	137	46	6	189
Napranum (S)	7	4	0	11
Noosa (S)	2,564	1,175	290	4,029
North Burnett (R)	633	182	26	841
Northern Peninsula Area (R)	25	46	9	80
Palm Island (S)	43	37	6	86
Paroo (S)	40	12	2	54
Porpuraaw (S)	3	1	0	4
Quilpie (S)	32	8	1	41
Redland (C)	7,692	3,897	1,473	13,061
Richmond (S)	45	20	2	66
Rockhampton (R)	3,777	1,405	292	5,473
Scenic Rim (R)	1,300	490	122	1,912
Somerset (R)	1,037	356	68	1,461
South Burnett (R)	1,447	450	66	1,963
Southern Downs (R)	1,119	314	42	1,475
Sunshine Coast (R)	12,641	4,148	1,225	18,013
Tablelands (R)	1,695	704	150	2,548
Toowoomba (R)	4,522	1,593	250	6,365
Torres (S)	107	172	32	311
Torres Strait Island (R)	6	9	2	17
Townsville (C)	8,289	3,998	916	13,203
Weipa (T)	230	237	37	504
Western Downs (R)	1,525	643	86	2,254
Whitsunday (R)	3,387	1,904	750	6,041
Winton (S)	32	11	2	45
Woorabinda (S)	3	0	0	3
Wujal Wujal (S)	4	4	0	8
Yarrabah (S)	36	25	3	64
Interstate	560	201	223	983
Overseas	0	0	5	5
Unknown	0	0	8	8
<b>Total</b>	<b>184,835</b>	<b>73,462</b>	<b>21,289</b>	<b>279,586</b>

Note: All registrations with an overseas or unknown address were classified as non-trailable as they were likely to be stored in marinas or dry storage facilities. Source: Economic Associates estimates based on data provided by TMR.

## 2.2.2 Historical incidence of boat ownership

To determine the projected number of boat registrations in each LGA, the boat registration data, in conjunction with historical population data, has been analysed to calculate the historical incidence of boat ownership (that is, the number of boat registrations per 1,000 persons). The historical incidence of boat ownership was calculated for the trailable and non-trailable fleets, as defined in Section 2.1.1 above.

In the 2005 to 2016 period, the average incidence of boat ownership was as follows:

- trailable boats up to 4.5 metres in length (including jet skis): 0.00 – 140.93 boats/1,000 persons
- trailable boats 4.5 – 8 metres in length: 0.26 – 81.45 boats/1,000 persons
- non-trailable boats: 0.00 – 22.39 boats/1,000 persons.

The historical incidence of boat ownership is highest in coastal communities such as Hinchinbrook Shire, Burdekin Shire, Cook Shire, Douglas Shire, Cassowary Coast, Livingstone Shire, Town of Weipa, and Whitsunday. Of these coastal communities, only Cook Shire recorded a decline in the incidence of boat ownership between 2005 and 2016.

Table 2.3 below summarises the average historical incidence of boat ownership by vessel class in the 2005 to 2016 period, by LGA.

**Table 2.3: Historical incidence of boat ownership (registrations / 1,000 persons) by LGA, 2005-2016**

LGA of registration	Trailable		Non-trailable	Change in incidence of boat ownership, 2005-2016		
	Up to 4.5m	4.5-8m		Trailable up to 4.5m	Trailable 4.5-8m	Non-trailable
Aurukun (S)	10.04	4.02	0.38	Decrease	Decrease	Decrease
Balonne (S)	40.95	17.04	2.49	Increase	Increase	Increase
Banana (S)	57.80	21.42	3.19	Increase	Increase	Increase
Barcaldine (R)	35.58	11.60	1.44	Increase	Increase	Increase
Barcoo (S)	51.88	10.19	0.79	Increase	Increase	Increase
Blackall-Tambo (R)	33.64	10.24	1.24	Increase	Increase	Increase
Boulia (S)	24.48	7.22	1.21	Increase	Decrease	Decrease
Brisbane (C)	15.62	6.91	2.83	Decrease	Decrease	Decrease
Bulloo (S)	28.32	5.12	0.81	Increase	Increase	Increase
Bundaberg (R)	74.12	16.67	4.32	Increase	Increase	Increase
Burdekin (S)	140.93	42.78	5.86	Increase	Increase	Increase
Burke (S)	57.71	19.99	3.16	Increase	Increase	Increase
Cairns (R)	39.61	20.12	5.61	Increase	Increase	Increase
Carpentaria (S)	78.97	36.00	5.52	Decrease	Decrease	Increase
Cassowary Coast (R)	89.70	47.12	9.85	Increase	Increase	Increase
Central Highlands (R)	49.70	23.49	3.81	Increase	Increase	Increase
Charters Towers (R)	40.01	11.72	1.44	Increase	Increase	Increase
Cherbourg (S)	0.00	0.26	0.00	Decrease	Increase	Decrease
Cloncurry (S)	34.44	13.93	1.73	Increase	Increase	Increase
Cook (S)	95.67	50.50	17.49	Decrease	Decrease	Decrease
Croydon (S)	52.07	18.63	1.98	Increase	Increase	Increase
Diamantina (S)	4.63	3.52	3.97	Increase	Decrease	Increase
Doomadgee (S)	0.89	0.48	0.09	Increase	Increase	Increase
Douglas (S)	73.99	42.56	13.53	Increase	Increase	Increase
Etheridge (S)	37.89	10.53	1.15	Increase	Increase	Increase
Flinders (S)	46.87	13.61	2.29	Increase	Increase	Increase

LGA of registration	Trailable		Non-trailable	Change in incidence of boat ownership, 2005-2016		
Fraser Coast (R)	66.53	26.79	7.61	Increase	Increase	Increase
Gladstone (R)	79.06	35.29	8.60	Increase	Increase	Increase
Gold Coast (C)	37.91	15.37	6.89	Increase	Decrease	Increase
Goondiwindi (R)	56.75	16.61	1.96	Increase	Increase	Increase
Gympie (R)	53.76	19.88	5.72	Increase	Decrease	Decrease
Hinchinbrook (S)	127.50	47.34	8.75	Increase	Increase	Increase
Hope Vale (S)	9.23	12.70	2.24	Increase	Increase	Increase
Ipswich (C)	22.38	8.70	1.50	Increase	Decrease	Decrease
Isaac (R)	66.00	27.22	4.91	Decrease	Increase	Increase
Kowanyama (S)	12.03	1.04	0.19	Increase	Increase	Increase
Livingstone (S)	76.25	35.82	11.49	Increase	Increase	Increase
Lockhart River (S)	13.47	9.89	3.44	Increase	Increase	Increase
Lockyer Valley (R)	28.06	10.09	1.64	Increase	Increase	Increase
Logan (C)	24.97	11.89	3.11	Increase	Increase	Decrease
Longreach (R)	44.70	11.47	1.31	Increase	Increase	Increase
Mackay (R)	80.15	26.34	7.12	Increase	Increase	Increase
McKinlay (S)	44.64	21.46	2.75	Increase	Increase	Increase
Mapoon (S)	11.81	20.58	2.47	Increase	Increase	Increase
Maranoa (R)	33.16	10.21	1.05	Increase	Increase	Increase
Mareeba (S)	41.49	15.42	3.37	Decrease	Increase	Increase
Moreton Bay (R)	35.99	14.15	3.83	Increase	Increase	Increase
Mornington (S)	13.72	8.46	0.69	Increase	Increase	Increase
Mount Isa (C)	34.93	16.02	1.80	Increase	Increase	Increase
Murweh (S)	24.34	7.78	0.96	Increase	Increase	Increase
Napranum (S)	2.55	1.05	0.10	Increase	Increase	Increase
Noosa (S)	49.02	20.44	5.63	Increase	Increase	Decrease
North Burnett (R)	56.88	14.71	2.21	Increase	Increase	Increase
Northern Peninsula Area (R)	13.50	16.20	2.89	Increase	Increase	Increase
Palm Island (S)	16.22	10.97	1.26	Increase	Increase	Increase
Paroo (S)	18.54	4.45	0.68	Increase	Increase	Increase
Pormpuraaw (S)	8.67	1.63	0.46	Increase	Increase	Decrease
Quilpie (S)	31.95	4.81	1.14	Increase	Increase	Increase
Redland (C)	45.06	25.97	9.87	Increase	Increase	Increase
Richmond (S)	54.01	21.46	1.50	Increase	Increase	Increase
Rockhampton (R)	38.81	15.38	3.87	Increase	Increase	Increase
Scenic Rim (R)	29.04	11.75	3.48	Increase	Decrease	Decrease
Somerset (R)	36.11	11.96	2.16	Increase	Increase	Increase
South Burnett (R)	37.61	12.34	1.85	Increase	Increase	Increase
Southern Downs (R)	26.78	7.78	1.01	Increase	Increase	Increase
Sunshine Coast (R)	39.41	14.10	4.13	Increase	Increase	Increase
Tablelands (R)	59.99	22.48	4.76	Increase	Increase	Increase
Toowoomba (R)	24.81	8.34	1.32	Increase	Increase	Increase
Torres (S)	36.94	52.51	8.75	Decrease	Decrease	Decrease
Torres Strait Island (R)	1.24	2.16	0.38	Increase	Increase	Increase
Townsville (C)	45.60	19.29	4.71	Decrease	Increase	Increase
Weipa (T)	94.96	81.45	13.46	Increase	Increase	Increase
Western Downs (R)	39.52	16.37	2.15	Increase	Increase	Increase
Whitsunday (R)	95.32	47.25	22.39	Increase	Increase	Increase
Winton (S)	26.57	7.06	1.06	Increase	Increase	Increase
Woorabinda (S)	17.89	4.02	0.24	Increase	Decrease	Decrease
Wujal Wujal (S)	18.41	8.76	1.27	Increase	Increase	Increase
Yarrabah (S)	14.68	5.85	0.80	Increase	Increase	Increase

Note: Decrease - a decline in the incidence of boat ownership per 1,000 persons between 2005 and 2016, Increase - an increase in the incidence of boat ownership per 1,000 persons between 2005 and 2016.

Source: Economic Associates estimates based on data provided by TMR



## 2.2.3 Projected population by LGA

To project boat registrations by LGA, this analysis assumes that the incidence of new boat registrations post 2016 is consistent with the 2005-2016 average (as outlined in Table 2.3 above).

The assessment has relied on the latest projections prepared by the Queensland Government Statistician's office (Queensland Government 2015, Population Projections by LGA, medium series), rebased to take into consideration the 2016 population estimates published by the Australian Bureau of Statistics (released subsequent to the 2016 Census of Population and Housing).

Table 2.4 below outlines the projected population of each LGA in Queensland.

**Table 2.4: Projected population by LGA, medium series, 2016-2036**

	2016	2021	2026	2031	2036
Aurukun (S)	1,323	1,348	1,429	1,508	1,583
Balonne (S)	4,480	4,424	4,391	4,370	4,360
Banana (S)	14,607	14,871	15,147	15,394	15,610
Barcaldine (R)	2,909	2,917	2,930	2,944	2,961
Barcoo (S)	272	260	250	241	233
Blackall-Tambo (R)	1,924	1,936	1,957	1,978	2,004
Boulia (S)	437	431	426	419	413
Brisbane (C)	1,184,215	1,253,917	1,313,403	1,382,062	1,442,700
Bulloo (S)	360	346	332	319	306
Bundaberg (R)	94,453	99,443	105,027	110,562	116,082
Burdekin (S)	17,313	17,584	17,932	18,237	18,482
Burke (S)	342	366	390	414	436
Cairns (R)	162,451	176,549	192,763	209,532	226,125
Carpentaria (S)	2,051	2,066	2,088	2,112	2,136
Cassowary Coast (R)	29,396	29,217	29,215	29,362	29,623
Central Highlands (R)	28,783	30,502	32,128	33,686	35,239
Charters Towers (R)	12,074	12,228	12,368	12,536	12,697
Cherbourg (S)	1,296	1,327	1,370	1,423	1,475
Cloncurry (S)	3,114	3,129	3,164	3,212	3,250
Cook (S)	4,424	4,460	4,489	4,500	4,501
Croydon (S)	300	303	311	318	324
Diamantina (S)	297	290	283	276	270
Doomadgee (S)	1,474	1,554	1,639	1,724	1,811
Douglas (S)	11,997	12,618	13,350	14,121	14,903
Etheridge (S)	819	801	797	793	789
Flinders (S)	1,569	1,523	1,482	1,443	1,409
Fraser Coast (R)	102,953	109,451	117,758	126,200	133,958
Gladstone (R)	63,288	71,179	79,595	88,257	96,407
Gold Coast (C)	576,918	637,516	716,113	800,916	888,608
Goondiwindi (R)	10,837	10,911	11,014	11,125	11,241
Gympie (R)	50,292	52,742	55,650	58,570	61,556
Hinchinbrook (S)	10,990	10,588	10,172	9,728	9,274
Hope Vale (S)	967	1,042	1,118	1,191	1,263
Ipswich (C)	200,123	239,761	312,287	397,611	494,461
Isaac (R)	21,563	22,822	24,381	26,033	27,637
Kowanyama (S)	984	1,016	1,049	1,082	1,115
Livingstone (S)	37,055	40,446	44,904	49,930	55,691
Lockhart River (S)	747	833	926	1,021	1,115
Lockyer Valley (R)	39,486	43,477	47,824	52,301	56,757
Logan (C)	313,785	343,395	386,764	432,492	493,469
Longreach (R)	3,727	3,622	3,530	3,441	3,360
Mackay (R)	117,703	126,031	136,237	147,596	159,564
McKinlay (S)	810	830	849	865	879

	2016	2021	2026	2031	2036
Mapoon (S)	322	333	345	357	369
Maranoa (R)	12,928	13,611	14,438	15,292	16,147
Mareeba (S)	22,157	22,293	22,459	22,581	22,684
Moreton Bay (R)	438,313	484,280	536,815	584,862	627,462
Mornington (S)	1,196	1,277	1,358	1,435	1,511
Mount Isa (C)	19,332	20,060	20,821	21,553	22,266
Murweh (S)	4,391	4,306	4,235	4,167	4,109
Napranum (S)	1,001	1,025	1,049	1,068	1,086
Noosa (S)	54,033	55,976	58,591	60,599	62,406
North Burnett (R)	10,623	10,454	10,367	10,273	10,169
Northern Peninsula Area (R)	2,952	3,153	3,352	3,537	3,707
Palm Island (S)	2,602	2,724	2,854	2,981	3,105
Paroo (S)	1,686	1,605	1,534	1,468	1,408
Porpuraaw (S)	785	828	874	919	964
Quilpie (S)	833	798	766	735	706
Redland (C)	151,987	162,352	173,030	180,987	185,065
Richmond (S)	800	761	730	703	680
Rockhampton (R)	81,589	85,694	90,105	94,555	99,104
Scenic Rim (R)	40,975	45,769	51,157	57,608	63,336
Somerset (R)	25,173	27,640	30,367	33,183	35,991
South Burnett (R)	32,747	34,237	36,000	37,783	39,542
Southern Downs (R)	35,622	36,827	38,046	39,262	40,452
Sunshine Coast (R)	303,389	338,162	379,049	423,122	467,945
Tablelands (R)	25,312	26,192	27,315	28,489	29,659
Toowoomba (R)	164,595	173,366	183,672	194,109	204,314
Torres (S)	3,789	3,900	4,028	4,161	4,301
Torres Strait Island (R)	4,785	4,836	4,898	4,958	5,022
Townsville (C)	192,058	211,600	233,015	255,311	278,025
Weipa (T)	4,024	4,373	4,646	5,008	5,347
Western Downs (R)	34,197	35,682	37,248	38,794	40,283
Whitsunday (R)	34,626	37,290	40,187	42,964	45,873
Winton (S)	1,156	1,118	1,085	1,055	1,028
Woorabinda (S)	992	1,014	1,045	1,077	1,114
Wujal Wujal (S)	296	303	310	316	321
Yarrabah (S)	2,703	2,835	3,006	3,184	3,363
<b>Total</b>	<b>4,848,877</b>	<b>5,246,746</b>	<b>5,728,030</b>	<b>6,240,301</b>	<b>6,764,941</b>

Source: Queensland Treasury (2016), ABS (2017b)

## 2.3 Projected size of recreational boating fleet

### 2.3.1 Projected size of fleet by LGA of registration

Based on the assumptions outlined above, the projected size of the recreational boating fleet registered in Queensland is projected to increase from 279,586 boats in 2016 to 381,988 boats in 2036, with the composition in 2036 anticipated to be as follows:

- 251,600 trailable boats up to 4.5 metres in length
- 100,795 trailable boats 4.5 – 8 metres in length
- 29,594 non-trailable boats.

Growth in the number of registrations is anticipated to be highest in a number of South-east Queensland councils, Cairns Regional Council, Townsville City Council and Mackay Regional Council.

Table 2.5 below summarises the projected size of the recreational boating fleet in Queensland by LGA of registration, between 2016 and 2036.

**Table 2.5: Projected size of recreational boating fleet by LGA of registration, 2016-2036**

	Trailable Fleet up to 4.5 metres					Trailable Fleet 4.5 - 8 metres					Non-Trailable Fleet				
	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036
Aurukun (S)	9	9	10	11	12	9	9	9	9	10	0	0	0	1	1
Balonne (S)	229	227	225	225	224	93	92	92	91	91	14	14	14	14	14
Banana (S)	928	943	959	973	986	371	377	382	388	392	54	55	56	57	57
Barcardine (R)	120	120	121	121	122	46	46	46	46	47	6	6	6	6	6
Barcoo (S)	22	21	21	20	20	7	7	7	7	7	2	2	2	2	2
Blackall-Tambo (R)	73	73	74	75	76	24	24	24	25	25	3	3	3	3	3
Boulia (S)	11	11	11	11	10	2	2	2	2	2	0	0	0	0	0
Brisbane (C)	18,600	19,688	20,615	21,686	22,630	7,539	8,022	8,436	8,914	9,337	3,009	3,207	3,377	3,573	3,746
Bulloo (S)	10	10	9	9	8	2	2	2	1	1	0	0	0	0	0
Bundaberg (R)	7,483	7,853	8,267	8,677	9,086	1,711	1,794	1,887	1,980	2,072	418	440	464	488	511
Burdekin (S)	2,560	2,598	2,647	2,690	2,724	887	899	914	927	937	123	125	127	128	130
Burke (S)	34	35	37	38	39	14	14	15	15	16	2	2	3	3	3
Cairns (R)	6,650	7,208	7,850	8,514	9,172	3,584	3,867	4,194	4,531	4,865	996	1,075	1,166	1,260	1,353
Carpentaria (S)	148	149	151	153	155	79	80	81	81	82	14	14	14	14	14
Cassowary Coast (R)	2,718	2,702	2,702	2,715	2,739	1,576	1,567	1,567	1,574	1,586	298	296	296	298	300
Central Highlands (R)	1,507	1,592	1,673	1,751	1,828	720	761	799	836	872	120	126	132	138	144
Charters Towers (R)	524	530	536	542	549	170	172	174	176	177	23	23	23	24	24
Cherbourg (S)	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0
Cloncurry (S)	125	126	127	128	130	55	55	56	56	57	6	6	6	6	6
Cook (S)	304	307	310	311	311	177	179	180	181	181	67	68	68	69	69
Croydon (S)	11	11	12	12	12	4	4	4	4	4	0	0	0	0	0
Diamantina (S)	6	6	6	6	6	0	0	0	0	0	1	1	1	1	1
Doomadgee (S)	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0
Douglas (S)	908	954	1,008	1,065	1,123	664	691	722	755	788	175	183	193	204	214
Etheridge (S)	38	37	37	37	37	12	11	11	11	11	1	1	1	1	1
Flinders (S)	83	81	79	77	75	30	30	29	28	28	7	7	7	7	6
Fraser Coast (R)	7,252	7,685	8,237	8,799	9,315	2,902	3,076	3,299	3,525	3,733	821	870	933	997	1,056
Gladstone (R)	5,148	5,772	6,437	7,122	7,766	2,435	2,713	3,010	3,316	3,604	538	606	679	753	823
Gold Coast (C)	24,407	26,704	29,684	32,899	36,224	8,121	9,052	10,260	11,564	12,911	3,739	4,156	4,698	5,282	5,887
Goondiwindi (R)	659	663	669	675	682	202	203	204	206	208	25	26	26	26	26
Gympie (R)	2,656	2,787	2,944	3,101	3,261	937	986	1,044	1,102	1,161	235	249	266	282	299
Hinchinbrook (S)	1,428	1,376	1,323	1,267	1,209	635	616	596	575	553	118	114	111	107	103
Hope Vale (S)	17	18	18	19	20	14	15	16	17	18	4	4	4	4	4
Ipswich (C)	4,537	5,423	7,046	8,955	11,122	1,630	1,975	2,606	3,349	4,192	282	342	450	578	723
Isaac (R)	1,381	1,464	1,567	1,676	1,782	611	646	688	733	777	111	117	124	132	140
Kowanyama (S)	8	8	9	9	10	1	1	1	1	1	0	0	0	0	0
Livingstone (S)	2,821	3,079	3,419	3,803	4,242	1,507	1,628	1,788	1,968	2,174	504	543	594	652	718
Lockhart River (S)	7	8	9	11	12	5	6	7	8	9	4	4	4	5	5
Lockyer Valley (R)	1,285	1,397	1,519	1,644	1,770	461	501	545	590	635	78	85	92	99	106
Logan (C)	8,691	9,431	10,514	11,655	13,178	3,593	3,945	4,461	5,005	5,730	789	881	1,016	1,158	1,347
Longreach (R)	191	186	182	178	175	59	58	57	56	55	7	6	6	6	6
Mackay (R)	9,909	10,577	11,395	12,305	13,265	3,515	3,734	4,003	4,302	4,617	814	873	946	1,027	1,112
McKinlay (S)	48	49	50	50	51	21	21	22	22	22	4	4	4	4	4
Mapoon (S)	8	8	8	8	9	5	5	5	5	6	0	0	1	1	1
Maranoa (R)	544	567	594	622	651	180	187	196	204	213	22	23	23	24	25
Mareeba (S)	838	844	851	856	860	353	355	358	360	361	79	79	80	80	80

	Trailable Fleet up to 4.5 metres					Trailable Fleet 4.5 - 8 metres					Non-Trailable Fleet				
	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036
Moreton Bay (R)	16,249	17,903	19,793	21,523	23,056	5,992	6,642	7,386	8,065	8,668	1,637	1,813	2,014	2,198	2,361
Mornington (S)	16	17	18	19	20	13	13	14	15	15	2	2	2	2	2
Mount Isa (C)	700	725	752	778	802	402	413	425	437	449	43	45	46	47	49
Murweh (S)	137	135	133	131	130	46	46	45	45	44	6	6	6	5	5
Napranum (S)	7	7	7	7	7	4	4	4	4	4	0	0	0	0	0
Noosa (S)	2,564	2,659	2,787	2,886	2,974	1,175	1,214	1,268	1,309	1,346	290	301	316	327	338
North Burnett (R)	633	623	618	613	607	182	180	178	177	175	26	26	25	25	25
Northern Peninsula Area (R)	25	28	30	33	35	46	49	52	55	58	9	10	10	11	11
Palm Island (S)	43	45	47	49	51	37	38	40	41	42	6	6	6	7	7
Paroo (S)	40	38	37	36	35	12	11	11	11	10	2	2	2	2	2
Pormpuraaw (S)	3	3	4	4	5	1	1	1	1	1	0	0	0	0	0
Quilpie (S)	32	31	30	29	28	8	8	8	8	7	1	1	1	1	1
Redland (C)	7,692	8,159	8,640	8,998	9,182	3,897	4,166	4,444	4,650	4,756	1,473	1,575	1,680	1,759	1,799
Richmond (S)	45	43	41	40	39	20	19	18	17	17	2	1	1	1	1
Rockhampton (R)	3,777	3,936	4,107	4,280	4,456	1,405	1,468	1,536	1,604	1,674	292	307	325	342	359
Scenic Rim (R)	1,300	1,439	1,596	1,783	1,949	490	547	610	686	753	122	139	157	180	200
Somerset (R)	1,037	1,126	1,224	1,326	1,428	356	386	419	452	486	68	73	79	85	91
South Burnett (R)	1,447	1,503	1,569	1,636	1,702	450	469	490	512	534	66	69	72	75	78
Southern Downs (R)	1,119	1,151	1,184	1,216	1,248	314	323	333	342	351	42	44	45	46	47
Sunshine Coast (R)	12,641	14,011	15,623	17,360	19,126	4,148	4,638	5,214	5,836	6,468	1,225	1,368	1,537	1,720	1,905
Tablelands (R)	1,695	1,748	1,815	1,885	1,956	704	723	749	775	801	150	154	159	165	170
Toowoomba (R)	4,522	4,739	4,995	5,254	5,507	1,593	1,666	1,752	1,839	1,924	250	262	276	289	303
Torres (S)	107	111	116	121	126	172	177	184	191	198	32	33	34	36	37
Torres Strait Island (R)	6	6	6	6	6	9	9	9	10	10	2	2	2	2	2
Townsville (C)	8,289	9,180	10,156	11,173	12,209	3,998	4,375	4,788	5,218	5,656	916	1,008	1,109	1,214	1,321
Weipa (T)	230	263	289	323	356	237	265	287	317	344	37	42	46	50	55
Western Downs (R)	1,525	1,584	1,646	1,707	1,766	643	667	693	718	743	86	89	92	96	99
Whitsunday (R)	3,387	3,641	3,917	4,182	4,459	1,904	2,030	2,167	2,298	2,436	750	809	874	936	1,002
Winton (S)	32	31	30	29	29	11	11	11	10	10	2	2	2	2	2
Woorabinda (S)	3	3	4	5	5	0	0	0	0	0	0	0	0	0	0
Wujal Wujal (S)	4	4	4	4	4	4	4	4	4	4	0	0	0	0	0
Yarrabah (S)	36	38	40	43	46	25	26	27	28	29	3	3	3	3	4
Interstate	560	563	566	570	573	201	202	203	205	206	223	224	226	228	229
Overseas	0	0	0	0	0	0	0	0	0	0	5	5	5	5	5
Unknown	0	0	0	0	0	0	0	0	0	0	8	8	8	8	8
<b>Total</b>	<b>184,835</b>	<b>198,834</b>	<b>215,790</b>	<b>233,554</b>	<b>251,600</b>	<b>73,462</b>	<b>79,223</b>	<b>86,171</b>	<b>93,430</b>	<b>100,795</b>	<b>21,289</b>	<b>23,068</b>	<b>25,180</b>	<b>27,382</b>	<b>29,594</b>

Source: Economic Associates estimate, derived from Table 2.3 and Table 2.4

### 2.3.2 Allocation of recreational boating fleet to LGA of use

The projected recreational boating fleet estimates presented in Table 2.4 above outline the projected number of boat registrations in each LGA in Queensland, that is, the number of boat registrations by place of residence. However, boat owners may utilise their boat in multiple LGAs, including LGAs other than their place of residence.

In allocating boat registrations to LGA of use, the assessment undertook a review of the distribution of boating infrastructure throughout Queensland and was informed by consultation with LGA and port/water storage officers undertaken by GHD as part of this project.

Two matrices were compiled which outline the distribution of boat registrations to the relevant LGA/s of use, one for trailable boat registrations and the other for non-trailable boat registrations. These two matrices are presented in Appendix A.

In the case of trailable boat registrations, allocations were made only to those LGAs with identified public boating infrastructure. Based on information provided by GHD, the following LGAs in Table 2.6 did not appear to have any public boating infrastructure, and hence were not allocated any boat registrations for use in that LGA.

**Table 2.6: LGAs with no boating infrastructure for trailable vessels**

Barcoo (S)	Flinders (S)
Blackall-Tambo (R)	Longreach (R)
Boulia (S)	Mareeba (S)
Bulloo (S)	Paroo (S)
Cherbourg (S)	Quilpie (S)
Cloncurry (S)	Richmond (S)
Croydon (S)	Winton (S)
Etheridge (S)	Woorabinda (S)

Non-trailable boats, on the other hand, were assumed to be used only in the coastal LGAs listed in Table 2.7 below.

**Table 2.7: Coastal LGAs capturing non-trailable boat registrations**

Brisbane (C)	Gold Coast (C)	
Bundaberg (R)	Gympie (R)	Northern Peninsula Area (R)
Burdekin (S)	Hinchinbrook (S)	Palm Island (S)
Burke (S)	Hope Vale (S)	Redland (C)
Cairns (R)	Isaac (R)	Rockhampton (R)
Carpentaria (S)	Livingstone (S)	Sunshine Coast (R)
Cassowary Coast (R)	Lockhart River (S)	Torres (S)
Cook (S)	Mackay (R)	Torres Strait Island (R)
Douglas (S)	Moreton Bay (R)	Townsville (C)
Fraser Coast (R)	Mornington (S)	Whitsunday (R)
Gladstone (R)	Noosa (S)	Yarrabah (S)

### 2.3.3 Projected size of fleet by LGA of use

Based on 2016 data, the size of the recreational boating fleet in Queensland is projected to increase from 272,472 boats in 2016 to 371,328 boats in 2036. The size of the recreational boating fleet in Queensland is approximately 3% lower than total boats registered in Queensland

as a result of vessel registration leakage, predominantly from the Gold Coast to northern New South Wales.

A number of LGAs are anticipated to record significant registration inflows, including:

- Redland City Council (net inflow of 8,740 vessels in 2016, increasing to 14,247 vessels in 2036)
- Gold Coast City Council (net inflow of 4,594 vessels in 2016, increasing to 7,844 vessels in 2036)
- Somerset Regional Council (net inflow of 3,075 vessels in 2016, increasing to 3,697 vessels in 2036)
- Sunshine Coast Regional Council (net inflow of 1,966 vessels in 2016, increasing to 2,314 vessels in 2036)
- Hinchinbrook Shire Council (net inflow of 1,894 vessels in 2016, increasing to 2,858 vessels in 2036)
- Scenic Rim Regional Council (net inflow of 1,559 vessels in 2016, increasing to 1,608 vessels in 2036)
- Cassowary Coast Regional Council (net inflow of 1,131 vessels in 2016, increasing to 1,350 vessels in 2036).

Table 2.8 below summarises the projected size of the recreational boating fleet by LGA of use, between 2016 and 2036.

**Table 2.8: Projected Size of Recreational Boating Fleet by LGA of Use, 2016-2036**

	Trailable fleet up to 4.5 metres					Trailable fleet 4.5 - 8 metres					Non-trailable fleet				
	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036
Aurukun (S)	9	9	10	11	12	9	9	9	9	10	0	0	0	1	1
Balonne (S)	46	45	45	45	45	19	18	18	18	18	0	0	0	0	0
Banana (S)	450	460	471	481	491	184	189	193	197	201	0	0	0	0	0
Barcaldine (R)	281	275	269	264	260	91	90	88	87	86	0	0	0	0	0
Barcoo (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blackall-Tambo (R)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Boulia (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brisbane (C)	15,698	16,831	18,050	19,401	20,712	6,292	6,779	7,298	7,871	8,426	2,761	2,959	3,156	3,374	3,578
Bulloo (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bundaberg (R)	7,454	7,837	8,267	8,695	9,118	1,810	1,906	2,013	2,119	2,224	456	480	508	535	562
Burdekin (S)	2,853	2,937	3,035	3,130	3,219	1,060	1,091	1,128	1,164	1,199	184	191	199	208	216
Burke (S)	34	35	37	38	39	14	14	15	15	16	2	2	3	3	3
Cairns (R)	7,171	7,713	8,339	8,986	9,627	3,785	4,058	4,373	4,700	5,023	1,058	1,134	1,223	1,314	1,405
Carpentaria (S)	469	478	489	501	512	248	252	257	262	267	65	66	68	69	70
Cassowary Coast (R)	3,447	3,460	3,496	3,546	3,605	1,878	1,883	1,899	1,922	1,950	398	401	406	413	421
Central Highlands (R)	927	973	1,018	1,060	1,103	431	453	474	494	513	0	0	0	0	0
Charters Towers (R)	347	347	348	349	350	118	118	118	118	118	0	0	0	0	0
Cherbourg (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cloncurry (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cook (S)	509	514	519	521	523	264	267	269	270	271	11	11	11	11	11
Croydon (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diamantina (S)	6	6	6	6	6	0	0	0	0	0	0	0	0	0	0
Doomadgee (S)	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0
Douglas (S)	1,388	1,450	1,523	1,599	1,675	873	907	947	989	1,031	338	354	370	388	406
Etheridge (S)	0	0	0	0	0	12	11	11	11	11	0	0	0	0	0
Flinders (S)	0	0	0	0	0	30	30	29	28	28	0	0	0	0	0
Fraser Coast (R)	7,467	7,902	8,454	9,015	9,533	2,912	3,083	3,302	3,524	3,729	847	897	961	1,025	1,084
Gladstone (R)	5,514	6,108	6,743	7,396	8,011	2,499	2,760	3,039	3,326	3,597	558	622	690	760	826
Gold Coast (C)	26,541	29,038	32,440	36,153	40,195	9,501	10,545	11,964	13,509	15,198	4,818	5,322	5,985	6,705	7,473
Goondiwindi (R)	690	693	698	704	710	219	220	222	223	225	0	0	0	0	0
Gympie (R)	2,916	3,083	3,284	3,489	3,694	1,041	1,103	1,178	1,254	1,330	297	316	339	362	386
Hinchinbrook (S)	2,609	2,702	2,806	2,914	3,023	1,205	1,246	1,292	1,340	1,389	260	271	284	297	310
Hope Vale (S)	17	18	18	19	20	14	15	16	17	18	4	4	4	4	4
Ipswich (C)	1,179	1,410	1,832	2,328	2,892	424	514	678	871	1,090	0	0	0	0	0
Isaac (R)	1,715	1,822	1,953	2,093	2,232	730	772	824	879	934	153	162	173	185	197
Kowanyama (S)	8	8	9	9	10	1	1	1	1	1	0	0	0	0	0
Livingstone (S)	3,230	3,492	3,822	4,188	4,602	1,639	1,760	1,914	2,085	2,277	539	578	627	682	743
Lockhart River (S)	7	8	9	11	12	5	6	7	8	9	4	4	4	5	5
Lockyer Valley (R)	450	489	532	576	619	161	175	191	207	222	0	0	0	0	0
Logan (C)	2,173	2,358	2,628	2,914	3,295	898	986	1,115	1,251	1,432	0	0	0	0	0
Longreach (R)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mackay (R)	9,185	9,803	10,558	11,396	12,279	3,299	3,505	3,756	4,034	4,327	787	843	913	989	1,069
McKinlay (S)	48	49	50	50	51	21	21	22	22	22	0	0	0	0	0



	Traillable fleet up to 4.5 metres					Traillable fleet 4.5 - 8 metres					Non-traillable fleet				
	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036
Mapoon (S)	8	8	8	8	9	5	5	5	5	6	0	0	1	1	1
Maranoa (R)	326	340	356	373	390	108	112	117	123	128	0	0	0	0	0
Mareeba (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moreton Bay (R)	15,743	17,253	18,933	20,506	21,904	5,804	6,395	7,053	7,669	8,216	1,649	1,814	1,997	2,169	2,322
Mornington (S)	16	17	18	19	20	13	13	14	15	15	2	2	2	2	2
Mount Isa (C)	526	544	562	581	598	294	302	311	319	327	0	0	0	0	0
Murweh (S)	263	258	254	250	247	82	81	80	79	78	0	0	0	0	0
Napranum (S)	7	7	7	7	7	4	4	4	4	4	0	0	0	0	0
Noosa (S)	2,923	3,071	3,259	3,426	3,586	1,251	1,309	1,382	1,447	1,509	339	356	378	397	416
North Burnett (R)	534	527	523	519	514	156	154	153	152	151	11	11	11	11	11
Northern Peninsula Area (R)	25	28	30	33	35	46	49	52	55	58	9	10	10	11	11
Palm Island (S)	43	45	47	49	51	37	38	40	41	42	6	6	6	7	7
Paroo (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pormpuraaw (S)	3	3	4	4	5	1	1	1	1	1	0	0	0	0	0
Quilpie (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Redland (C)	13,870	14,948	16,310	17,667	18,993	6,030	6,549	7,187	7,805	8,389	1,901	2,062	2,256	2,437	2,602
Richmond (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rockhampton (R)	4,228	4,439	4,674	4,917	5,169	1,669	1,757	1,855	1,957	2,063	418	442	469	496	525
Scenic Rim (R)	2,570	2,736	2,924	3,134	3,328	901	962	1,032	1,110	1,183	0	0	0	0	0
Somerset (R)	3,327	3,529	3,747	3,972	4,191	1,209	1,280	1,356	1,435	1,511	0	0	0	0	0
South Burnett (R)	1,302	1,353	1,412	1,473	1,532	406	423	442	462	482	0	0	0	0	0
Southern Downs (R)	1,319	1,373	1,433	1,494	1,554	556	577	601	625	648	0	0	0	0	0
Sunshine Coast (R)	13,897	15,342	17,026	18,808	20,593	4,685	5,209	5,820	6,465	7,110	1,397	1,551	1,730	1,920	2,110
Tablelands (R)	678	699	726	754	782	281	289	299	310	321	0	0	0	0	0
Toowoomba (R)	904	948	999	1,051	1,101	319	333	350	368	385	0	0	0	0	0
Torres (S)	107	111	116	121	126	172	177	184	191	198	32	33	34	36	37
Torres Strait Island (R)	6	6	6	6	6	9	9	9	10	10	2	2	2	2	2
Townsville (C)	7,073	7,785	8,566	9,379	10,207	3,359	3,660	3,990	4,333	4,683	779	853	933	1,017	1,103
Weipa (T)	230	263	289	323	356	237	265	287	317	344	0	0	0	0	0
Western Downs (R)	1,095	1,132	1,173	1,215	1,255	440	455	471	486	502	0	0	0	0	0
Whitsunday (R)	3,900	4,180	4,490	4,795	5,115	2,039	2,170	2,315	2,457	2,605	754	814	879	942	1,008
Winton (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Woorabinda (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wujal Wujal (S)	4	4	4	4	4	4	4	4	4	4	0	0	0	0	0
Yarrabah (S)	36	38	40	43	46	25	26	27	28	29	3	3	3	3	4
<b>Total</b>	<b>179,803</b>	<b>193,341</b>	<b>209,700</b>	<b>226,820</b>	<b>244,200</b>	<b>71,825</b>	<b>77,399</b>	<b>84,104</b>	<b>91,102</b>	<b>98,196</b>	<b>20,844</b>	<b>22,580</b>	<b>24,638</b>	<b>26,781</b>	<b>28,932</b>

Source: Economic Associates estimates, derived from Table 2.5, Table A.1 and Table A.2

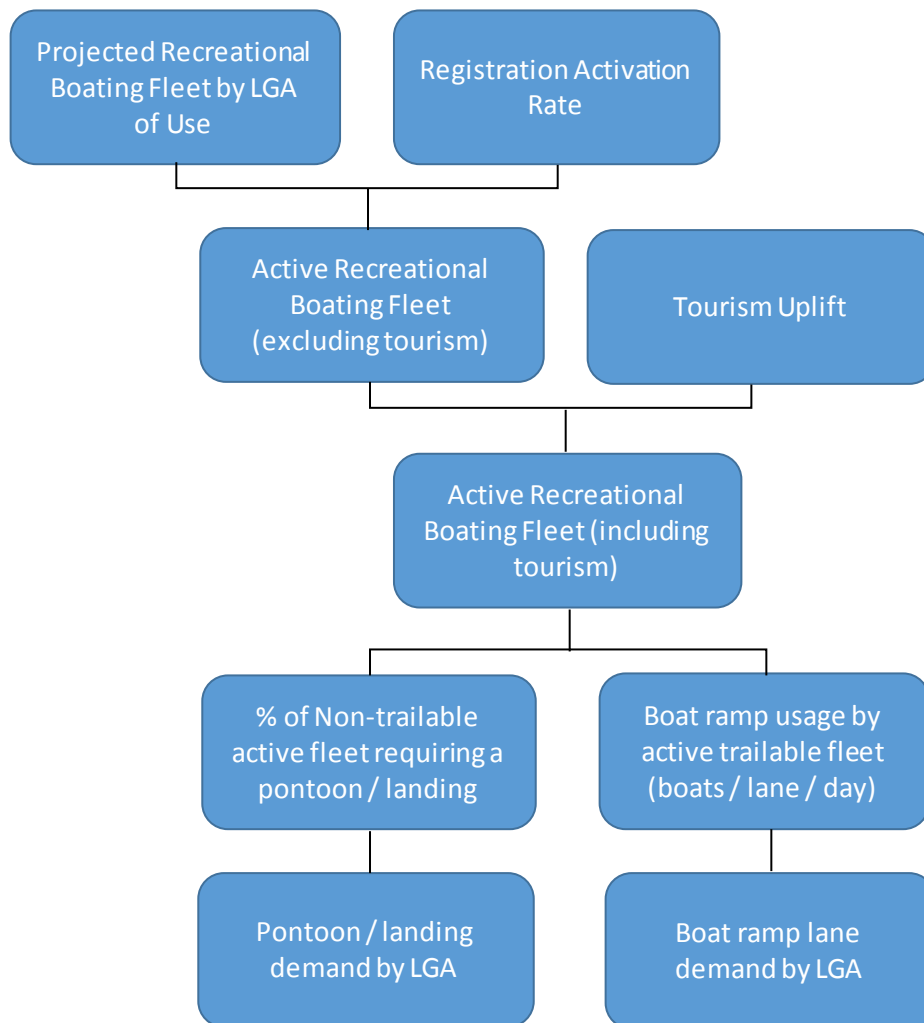
### 3 INFRASTRUCTURE DEMAND ASSESSMENT

This section converts recreational boating fleet projections into infrastructure demand projections for boat ramp lanes and landings (i.e. publically accessible deep-draught vessel pontoons) at the LGA level.

In determining infrastructure demand, the assessment estimates the likely number of boats being utilised on a day of average demand. This estimate is described as the active fleet. From here, assumptions are made relating to the relationship between trailable boats and boat ramp lane demand, and the relationship between non-trailable boats and likely landings demand.

Figure 3.1 below outlines the methodology utilised to calculate boat ramp lane and landings demand.

**Figure 3.1: Methodology to calculate boat ramp lane and landings demand at the LGA level**



## 3.1 Size of active fleet assumptions

### 3.1.1 Registration activation rate

TMR recognises three levels of demand for marine facilities, namely:

- off-peak demand – typical weekday usage
- average demand – taken to be demand for a facility on weekends (and, for certain regional locations, other busy periods)
- peak demand – demand for a facility at peak holiday periods or for special events.

The *Recreational Boating Facilities Demand Forecasting Study 2011* identified the proportion of the recreational boating fleet likely to use boating facilities for each level of demand (referred to herein as the registration activation rate):

- off-peak demand: 8%
- average demand: 14%
- peak demand: 20%.

TMR policy on catering for marine facility demand is as follows:

*TMR expects off-peak demand at a given facility to be met in almost all circumstances. Its program of works is aimed at satisfying average demand.*

*TMR does not cater for peak demand. This is because funds (provided largely by collection of recreational boat registration fees) are stretched meeting demand for basic marine infrastructure such as dredging, landings, breakwaters and boat ramps around the state, and local managing authorities cannot allocate sufficient resources (land and funds) for peak demand days. Scarce foreshore land is in intense demand for other purposes, as is funding.*

An initial assessment of demand identified that applying the average demand activation rate state-wide substantially overestimated the current and projected demand for facilities in some LGAs, based on complaints and observed levels of congestion at various facilities in those LGAs.

Therefore, unlike the *Recreational Boating Facilities Demand Forecasting Study 2011*, this study has considered differing registration activation rates by LGA.

This approach has been taken to recognise that the level of boat usage is likely to differ by LGA, depending on a range of factors, including access to recreational boating facilities, the range of recreational activities other than boating available to the community, the recreational time available to boat users (for example, retirees are likely to have more available time to undertake boating activities than persons employed on a fulltime basis), and nature of employment (for example, persons who finish work in the early afternoon are likely to have more available time to undertake boating activities than persons who finish work in the evening).

The consultation with LGA and port/water storage managers undertaken by GHD as part of this study indicated that recreational boaters typically use their boat to go fishing. A literature review was undertaken to identify the socio-economic and demographic characteristics of persons who participated in recreational fishing.

Ormsby, Jayne (2004) undertook a survey to identify the social, motivational and experiential aspects of recreational fishing by anglers from Queensland. The survey identified that just under

a quarter of respondents were classified as tradespersons and related workers, significantly higher than any other occupational class.

The Australian Bureau of Statistics (ABS) (2010) considers the participation rate of Australians in a number of sports, including fishing. This research identified that the participation rate for fishing was highest for the 55-64 year age cohort, followed by the 45-54 year age cohort. Interestingly, this result directly contradicts the findings of Department of Agriculture and Fisheries (2014), which identifies recreational fishing participation rates as being highest for the 5-14 year age cohort, and lowest for the 60+ year age cohort.

Participation rates in both studies represent the proportion of persons that participate in fishing in a given year, but do not provide insight as to the frequency of participation in that year. This means that while a certain age cohort may have a high participation rate, these persons may only go fishing once a year, while other age cohorts might have lower participation rates but higher frequency of participation. The literature review did not identify any information in relation to the frequency of participation in fishing or recreational boating by age cohort.

Our assessment has assumed that a higher average age is likely to correspond with a higher frequency of recreational boat usage, due to the greater availability of time for recreational pursuits, such as fishing and boating.

Within each LGA, the following factors were considered in refining the appropriate registration activation rate.

- incidence of blue collar employment (based on 2016 Census)
- average age of residents (based on 2016 Census)
- remoteness classification by local government area (Accessibility/Remoteness Index of Australia (ARIA+))
- whether the LGA was coastal.

ARIA+ is an index of remoteness derived from measures of road distances between populated localities to each of five categories of service centre, namely:

- distance between populated locality and population centre of 250,000+ persons
- distance between populated locality and population centre of 48,000-249,999 persons
- distance between populated locality and population centre of 18,000-47,999 persons
- distance between populated locality and population centre of 5,000-17,999 persons
- distance between populated locality and population centre of 1,000-4,999 persons.

The five distance measurements, one to each level of service centre, is recorded for each populated locality and standardised to a ratio. The ratio is calculated by dividing the measured distance for a given locality by the Australian average (mean) for that category. After applying a threshold of three to each of the ratios, all ratios are summed to produce the ARIA+ score for each populated locality across Australia. An interpolation procedure is then used to derive the index values for larger geographic areas such as LGAs.

ARIA+ is the endorsed measure of remoteness utilised by the ABS.

The fit between the ARIA+ remoteness classifications and our classification is summarised in Table 3.1 below.

**Table 3.1: Fit between ARIA+ remoteness classification and EA classification**

<b>ARIA+ remoteness classification</b>	<b>EA classification</b>
Highly accessible / accessible	Metropolitan
Moderately accessible	Regional centre
Remote	Remote
Very remote	Very Remote

To determine the appropriate registration activation rate, the following steps were taken:

- All LGAs with an ARIA+ classification of highly accessible or accessible (we have called metropolitan) were assigned a registration activation rate of 8%.
- All LGAs with an ARIA+ classification of moderately accessible (we have called regional centre) were assigned a registration activation rate as follows:
  - If the LGA has a higher incidence of blue collar workers and a higher average age than Queensland – registration activation rate is 12%.
  - For all other LGAs – registration activation rate is 10%.
- All LGAs with an ARIA+ classification of remote were assigned a registration activation rate as follows:
  - If the LGA has a higher incidence of blue collar workers and a higher average age than Queensland – registration activation rate is 14%.
  - All other LGAs – registration activation rate is 12%.
- All LGAs with an ARIA+ classification of very remote were assigned a registration activation rate of 14%.

After completing this first assessment, the registration activation rates were then adjusted to reflect whether the LGA was coastal or not. If the LGA was coastal, the registration activation rate remained unchanged. However, if the LGA was non-coastal, the registration activation rate was adjusted downwards by 2% (for example, if the registration activation rate was 12% and the LGA was non-coastal, the adjusted activation rate was 10%). This adjustment was made to reflect the extra travel distance required to access recreational boating facilities relative to persons who resided in coastal LGAs. It is considered that the further a person has to travel to access recreational boating facilities, the less often these facilities will typically be utilised. If the registration activation rate was already 8%, the rate remained unchanged.

A further reduction in activation was applied to a number of coastal LGAs in South-east Queensland with a broad offering of recreational activities, including boating, where it was determined that the appropriate registration activation rate was in the order of 6%-7%.

Based on the above criteria, Table 3.2 below summarises the activation rates applied to each LGA in Queensland.

**Table 3.2: Assumed activation rate by LGA, Queensland**

	% Blue collar workers	Average age	Remoteness	Coastal?	Activation rate
Aurukun (S)	33.6%	29.2	Very Remote	y	14%
Balonne (S)	35.1%	38.9	Remote	n	12%
Banana (S)	45.5%	37.5	Remote	n	10%
Barcaldine (R)	35.1%	39.6	Very Remote	n	12%
Barcoo (S)	50.0%	41.4	Very Remote	n	12%
Blackall-Tambo (R)	34.7%	42.9	Very Remote	n	12%
Boulia (S)	54.1%	34.1	Very Remote	n	12%
Brisbane City	22.0%	36.8	Metropolitan	y	6%
Bulloo (S)	42.5%	33.8	Very Remote	n	12%
Bundaberg (R)	37.7%	42.9	Regional Centre	y	12%
Burdekin (S)	42.9%	42.5	Regional Centre	y	12%
Burke (S)	38.8%	39.3	Very Remote	y	14%
Cairns (R)	30.5%	37.3	Regional Centre	y	10%
Carpentaria (S)	41.2%	37.1	Very Remote	y	14%
Cassowary Coast (R)	44.1%	41.7	Remote	y	14%
Central Highlands (R)	47.9%	33.4	Remote	n	10%
Charters Towers (R)	40.3%	39.3	Remote	n	12%
Cherbourg (S)	30.0%	25.2	Very Remote	n	12%
Cloncurry (S)	48.8%	35.6	Very Remote	n	12%
Cook (S)	38.3%	39.1	Remote	y	14%
Croydon (S)	40.7%	35.6	Very Remote	n	12%
Diamantina (S)	45.3%	32.9	Very Remote	n	12%
Doomadgee (S)	27.2%	23.7	Very Remote	y	14%
Douglas (S)	35.7%	41.4	Regional Centre	y	12%
Etheridge (S)	43.0%	39.5	Very Remote	n	12%
Flinders (S)	37.2%	40.5	Very Remote	n	12%
Fraser Coast (R)	34.4%	44.7	Regional Centre	y	12%
Gladstone (R)	46.8%	35.6	Regional Centre	y	10%
Gold Coast (C)	29.8%	39.1	Metropolitan	y	6%
Goondiwindi (R)	37.8%	39.2	Regional Centre	n	10%
Gympie (R)	40.1%	42.9	Metropolitan	y	8%
Hinchinbrook (S)	40.9%	46.1	Remote	y	14%
Hope Vale (S)	42.2%	28.3	Very Remote	y	14%
Ipswich (C)	37.7%	34.2	Metropolitan	n	8%
Isaac (R)	55.6%	32.0	Remote	y	12%
Kowanyama (S)	34.8%	29.8	Very Remote	y	14%
Livingstone (S)	38.2%	40.6	Very Remote	y	14%
Lockhart River (S)	35.3%	25.6	Very Remote	y	14%
Lockyer Valley (R)	43.4%	38.7	Metropolitan	n	8%
Logan (C)	40.3%	35.4	Metropolitan	n	8%
Longreach (R)	32.0%	39.6	Very Remote	n	12%
Mackay (R)	43.4%	37.5	Regional Centre	y	10%
McKinlay (S)	40.2%	36.6	Very Remote	n	12%
Mapoon (S)	26.8%	32.6	Very Remote	y	14%
Maranoa (R)	35.4%	37.4	Remote	n	10%
Mareeba (S)	36.6%	41.4	Remote	n	12%
Moreton Bay (R)	33.4%	38.0	Metropolitan	y	7%
Mornington (S)	30.8%	29.1	Very Remote	y	14%
Mount Isa (C)	47.2%	32.4	Very Remote	n	12%
Murweh (S)	37.6%	38.8	Very Remote	n	12%
Napranum (S)	52.3%	28.7	Very Remote	y	14%
Noosa (S)	30.8%	44.9	Metropolitan	y	8%
North Burnett (R)	40.3%	43.7	Regional Centre	n	10%
Northern Peninsula Area (R)	32.3%	26.0	Very Remote	y	14%
Palm Island (S)	28.0%	27.4	Very Remote	y	14%
Paroo (S)	28.0%	41.2	Very Remote	n	12%
Pormpuraaw (S)	33.3%	30.5	Very Remote	y	14%
Quilpie (S)	40.0%	37.9	Very Remote	n	12%
Redland (C)	32.0%	40.3	Metropolitan	y	6%
Richmond (S)	39.6%	34.9	Very Remote	n	12%
Rockhampton (R)	38.1%	37.5	Regional Centre	y	10%

	% Blue collar workers	Average age	Remoteness	Coastal?	Activation rate
Scenic Rim (R)	37.9%	41.8	Metropolitan	n	8%
Somerset (R)	43.1%	40.4	Metropolitan	n	8%
South Burnett (R)	39.2%	42.5	Regional Centre	n	10%
Southern Downs (R)	39.5%	42.6	Regional Centre	n	10%
Sunshine Coast (R)	31.6%	41.6	Metropolitan	y	6%
Tablelands (R)	35.0%	43.6	Remote	n	12%
Toowoomba (R)	34.1%	39.1	Metropolitan	n	8%
Torres (S)	26.6%	30.6	Very Remote	y	14%
Torres Strait Island (R)	30.3%	27.7	Very Remote	y	14%
Townsville (C)	32.2%	36.0	Regional Centre	y	10%
Weipa (T)	56.5%	30.4	Very Remote	y	14%
Western Downs (R)	39.8%	37.8	Regional Centre	n	8%
Whitsunday (R)	43.7%	38.8	Remote	y	14%
Winton (S)	36.2%	44.2	Very Remote	n	12%
Woorabinda (S)	30.4%	25.3	Very Remote	n	12%
Wujal Wujal (S)	25.0%	32.7	Remote	y	12%
Yarrabah (S)	26.6%	26.8	Regional Centre	y	10%
Queensland	31.8%	38.2			

Note: Highlighted cells have a higher incidence of blue collar workers / higher average age than Queensland

### 3.1.2 Tourism Adjustment

The following LGAs were considered to record a significant uplift in boating infrastructure demand as a result of tourism activity:

- first tier LGAs:
  - Douglas Shire
  - Cairns Regional Council
  - Whitsunday Regional Council
- second tier LGAs:
  - Townsville City Council
  - Fraser Coast Council
  - Mackay Regional Council
  - Livingstone Shire Council.

The assumed uplift in boat lane demand was assumed to be as follows:

- first tier LGAs: 20% uplift in boat ramp lane and pontoon/landing demand
- second tier LGAs: 10% uplift in boat ramp lane and pontoon/landing demand.

Consultation also identified that the northern coastal LGAs of Burke, Cook and Carpentaria Shire record significant increases in demand for boating infrastructure during winter, with significant inflows of grey nomads. However, it was also identified that boating infrastructure within these LGAs was more than sufficient to accommodate these inflows.

## 3.2 Projected size of active fleet

Based on the above assumptions, the projected size of the active fleet in Queensland on a day of average demand is projected to increase from 24,298 vessels in 2016 to 32,524 vessels in 2036.

The size of the active fleet on a day of average demand is anticipated to be largest in the following LGAs, reflecting the large population residing in the South-east Queensland area:

- Gold Coast City Council (2,442 vessels in 2016, increasing to 3,764 vessels in 2036)
- Moreton Bay Regional Council (1,628 vessels in 2016, increasing to 2,268 vessels in 2036)
- Brisbane City Council (1,480 vessels in 2016, increasing to 1,969 vessels in 2036)
- Redland City Council (1,314 vessels in 2016, increasing to 1,803 vessels in 2036)
- Sunshine Coast Regional Council (1,195 vessels in 2016, increasing to 1,783 vessels in 2036).

Table 3.3 below summarises the size of the active fleet on a day of average demand between 2016 and 2036.



**Table 3.3: Projected size of active fleet on a day of average demand, 2016-2036**

	Traillable Fleet up to 4.5 metres					Traillable Fleet 4.5 - 8 metres					Non-Traillable Fleet				
	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036
Aurukun (S)	1	1	1	2	2	1	1	1	1	1	0	0	0	0	0
Balonne (S)	5	5	5	5	5	2	2	2	2	2	0	0	0	0	0
Banana (S)	45	46	47	48	49	18	19	19	20	20	0	0	0	0	0
Barcaldine (R)	34	33	32	32	31	11	11	11	10	10	0	0	0	0	0
Barcoo (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blackall-Tambo (R)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Boulia (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brisbane (C)	942	1,010	1,083	1,164	1,243	378	407	438	472	506	160	180	180	200	220
Bulloo (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bundaberg (R)	894	940	992	1,043	1,094	217	229	242	254	267	60	60	60	60	60
Burdekin (S)	342	352	364	376	386	127	131	135	140	144	20	20	20	20	20
Burke (S)	5	5	5	5	6	2	2	2	2	2	0	0	0	0	0
Cairns (R)	860	925	1,001	1,079	1,156	454	487	524	564	602	120	140	140	160	160
Carpentaria (S)	66	67	69	70	72	35	35	36	37	37	0	0	0	0	0
Cassowary Coast (R)	483	484	489	496	505	263	264	266	269	273	60	60	60	60	60
Central Highlands (R)	93	97	102	106	110	43	45	47	49	51	0	0	0	0	0
Charters Towers (R)	42	42	42	42	42	14	14	14	14	14	0	0	0	0	0
Cherbourg (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cloncurry (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cook (S)	71	72	73	73	73	37	37	38	38	38	0	0	0	0	0
Croydon (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diamantina (S)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Doomadgee (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Douglas (S)	200	209	220	230	241	126	131	137	143	149	40	40	40	40	40
Etheridge (S)	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0
Flinders (S)	0	0	0	0	0	4	4	3	3	3	0	0	0	0	0
Fraser Coast (R)	986	1,043	1,115	1,190	1,258	384	407	436	465	493	120	120	140	140	160
Gladstone (R)	551	611	674	740	801	250	276	304	333	360	60	60	60	80	80
Gold Coast (C)	1,592	1,742	1,946	2,169	2,412	570	633	718	811	912	280	320	360	400	440
Goondiwindi (R)	69	69	70	70	71	22	22	22	22	23	0	0	0	0	0
Gympie (R)	233	247	263	279	296	83	88	94	100	106	20	20	20	20	40
Hinchinbrook (S)	365	378	393	408	423	169	174	181	188	194	40	40	40	40	40
Hope Vale (S)	2	2	3	3	3	2	2	2	2	3	0	0	0	0	0
Ipswich (C)	94	113	147	186	231	34	41	54	70	87	0	0	0	0	0
Isaac (R)	206	219	234	251	268	88	93	99	105	112	20	20	20	20	20
Kowanyama (S)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Livingstone (S)	497	538	589	645	708	252	271	295	321	351	80	80	80	120	120
Lockhart River (S)	1	1	1	1	2	1	1	1	1	1	0	0	0	0	0
Lockyer Valley (R)	36	39	43	46	50	13	14	15	17	18	0	0	0	0	0
Logan (C)	174	189	210	233	264	72	79	89	100	115	0	0	0	0	0
Longreach (R)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mackay (R)	1,010	1,078	1,162	1,254	1,351	363	385	414	443	476	80	80	120	120	120
McKinlay (S)	6	6	6	6	6	2	3	3	3	3	0	0	0	0	0
Mapoon (S)	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0

	Trailable Fleet up to 4.5 metres					Trailable Fleet 4.5 - 8 metres					Non-Trailable Fleet				
	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036
Maranoa (R)	33	34	36	37	39	11	11	12	12	13	0	0	0	0	0
Mareeba (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moreton Bay (R)	1,102	1,208	1,325	1,435	1,533	406	448	494	537	575	120	120	140	160	160
Mornington (S)	2	2	3	3	3	2	2	2	2	2	0	0	0	0	0
Mount Isa (C)	63	65	67	70	72	35	36	37	38	39	0	0	0	0	0
Murweh (S)	32	31	30	30	30	10	10	10	10	9	0	0	0	0	0
Napranum (S)	1	1	1	1	1	0	1	1	1	1	0	0	0	0	0
Noosa (S)	234	246	261	274	287	100	105	111	116	121	20	20	40	40	40
North Burnett (R)	53	53	52	52	51	16	15	15	15	15	0	0	0	0	0
Northern Peninsula Area (R)	4	4	4	5	5	6	7	7	8	8	0	0	0	0	0
Palm Island (S)	6	6	7	7	7	5	5	6	6	6	0	0	0	0	0
Paroo (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pormpuraaw (S)	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0
Quilpie (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Redland (C)	832	897	979	1,060	1,140	362	393	431	468	503	120	120	140	140	160
Richmond (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rockhampton (R)	423	444	467	492	517	167	176	186	196	206	40	40	40	40	60
Scenic Rim (R)	206	219	234	251	266	72	77	83	89	95	0	0	0	0	0
Somerset (R)	266	282	300	318	335	97	102	108	115	121	0	0	0	0	0
South Burnett (R)	130	135	141	147	153	41	42	44	46	48	0	0	0	0	0
Southern Downs (R)	132	137	143	149	155	56	58	60	62	65	0	0	0	0	0
Sunshine Coast (R)	834	921	1,022	1,129	1,236	281	313	349	388	427	80	100	100	120	120
Tablelands (R)	81	84	87	90	94	34	35	36	37	38	0	0	0	0	0
Toowoomba (R)	72	76	80	84	88	25	27	28	29	31	0	0	0	0	0
Torres (S)	15	16	16	17	18	24	25	26	27	28	0	0	0	0	0
Torres Strait Island (R)	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
Townsville (C)	778	856	943	1,032	1,123	370	403	439	476	515	80	80	120	120	140
Weipa (T)	32	37	40	45	50	33	37	40	44	48	0	0	0	0	0
Western Downs (R)	88	91	94	97	100	35	36	38	39	40	0	0	0	0	0
Whitsunday (R)	655	702	755	805	859	342	365	389	413	438	120	140	140	160	160
Winton (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Woorabinda (S)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wujal Wujal (S)	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0
Yarrabah (S)	4	4	4	4	5	2	3	3	3	3	0	0	0	0	0
<b>Total</b>	<b>15,987</b>	<b>17,118</b>	<b>18,476</b>	<b>19,892</b>	<b>21,333</b>	<b>6,571</b>	<b>7,042</b>	<b>7,599</b>	<b>8,180</b>	<b>8,771</b>	<b>1,740</b>	<b>1,860</b>	<b>2,060</b>	<b>2,260</b>	<b>2,420</b>

Source: Economic Associates estimates

### 3.3 Relationship between active fleet and boating infrastructure demand

#### 3.3.1 Conversion of active trailable fleet to boat ramp lane demand

Converting active trailable fleet estimates into boat ramp lane demand has been undertaken based on throughput rates of ramps. In SKM (1988) and Rose et. al. (2009), a rate of 30 boats per lane per day is considered to provide unhampered overall amenity, whereas a rate of 50 boats per lane per day represents congested operations.

It has been assumed that the midpoint (40) between unhampered overall amenity (30 boats per lane per day) and congested operations (50 boats per lane per day) would represent the ideal scenario, as it balances the needs and wants of trailable boat owners against the costs incurred by local governments, port authorities, water storage managers, state governments and the private sector in providing boat ramps.

This assumption is consistent with the assumption made in the *Recreational Boating Facilities Demand Forecasting Study 2011*.

#### 3.3.2 Relationship between active non-trailable fleet and pontoon/landing demand

The literature review did not uncover any literature relating to public pontoon/landing demand.

Public pontoon/landing demand is driven by the size of the non-trailable fleet. The assessment has assumed that on a given day, an estimated 5% of the active non-trailable fleet is anticipated to demand a public pontoon/landing.

### 3.4 Projected boat ramp lane demand

Total boat ramp lane demand in Queensland is projected to increase from 563 lanes in 2016 to 757 lanes in 2036 (refer to Table 3.4 below). The LGAs anticipated to record the highest demand for boat ramps are:

- Gold Coast City Council (54 boat ramp lanes in 2016, 83 boat ramp lanes in 2036)
- Moreton Bay Regional Council (38 boat ramp lanes in 2016, 52 boat ramp lanes in 2036)
- Brisbane City Council (33 boat ramp lanes in 2016, 44 boat ramp lanes in 2036)
- Redland City Council (30 boat ramp lanes in 2016, 42 boat ramp lanes in 2036)
- Mackay Regional Council (34 boat ramp lanes in 2016, 46 boat ramp lanes in 2036)
- Fraser Coast Regional Council (34 boat ramp lanes in 2016, 44 boat ramp lanes in 2036)
- Cairns Regional Council (33 boat ramp lanes in 2016, 45 boat ramp lanes in 2036)
- Townsville City Council (29 boat ramp lanes in 2016, 42 boat ramp lanes in 2036)
- Sunshine Coast Regional Council (28 boat ramp lanes in 2016, 42 boat ramp lanes in 2036)
- Bundaberg Regional Council (27 boat ramp lanes in 2016, 34 boat ramp lanes in 2036).

Table 3.4 below identifies that some LGAs have demand for less than one boat ramp lane. These LGAs currently have either little or no public boating infrastructure but recorded vessel registrations.

**Table 3.4: Projected boat ramp lane demand by LGA, 2016-2036**

	Trailable Fleet up to 4.5 metres					Trailable Fleet 4.5 - 8 metres					Total				
	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036
Aurukun (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Balonne (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Banana (S)	1	1	1	1	1	<1	<1	<1	1	1	1	1	1	2	2
Barcardine (R)	1	1	1	1	1	<1	<1	<1	<1	<1	1	1	1	1	1
Barcoo (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Blackall-Tambo (R)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Boulia (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Brisbane (C)	24	25	27	29	31	9	10	11	12	13	33	35	38	41	44
Bulloo (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bundaberg (R)	22	24	25	26	27	5	6	6	6	7	27	30	31	32	34
Burdekin (S)	9	9	9	9	10	3	3	3	4	4	12	12	12	13	14
Burke (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cairns (R)	22	23	25	26	29	11	12	13	14	16	33	35	38	40	45
Carpentaria (S)	2	2	2	2	2	1	1	1	1	1	3	3	3	3	3
Cassowary Coast (R)	12	12	12	12	13	7	7	7	7	7	19	19	19	19	20
Central Highlands (R)	2	2	3	3	3	1	1	1	1	1	3	3	4	4	4
Charters Towers (R)	1	1	1	1	1	<1	<1	<1	<1	<1	1	1	1	1	1
Cherbourg (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cloncurry (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cook (S)	2	2	2	2	2	1	1	1	1	1	3	3	3	3	3
Croydon (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Diamantina (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Doomadgee (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Douglas (S)	5	5	6	6	6	4	4	4	4	4	9	9	10	10	10
Etheridge (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Flinders (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Fraser Coast (R)	24	26	28	30	32	10	10	11	12	12	34	36	39	42	44
Gladstone (R)	14	15	17	19	20	6	7	8	8	9	20	22	25	27	29
Gold Coast (C)	40	44	49	54	60	14	16	18	20	23	54	60	67	74	83
Goondiwindi (R)	2	2	2	2	2	1	1	1	1	1	3	3	3	3	3
Gympie (R)	6	6	7	7	7	2	2	2	3	3	8	8	9	10	10
Hinchinbrook (S)	9	9	10	10	11	4	4	5	5	5	13	13	15	15	16
Hope Vale (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ipswich (C)	2	3	4	5	6	1	1	1	2	2	3	4	5	7	8
Isaac (R)	5	5	6	6	7	2	2	2	3	3	7	7	8	9	10
Kowanyama (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Livingstone (S)	12	13	14	17	18	7	7	8	8	9	19	20	22	25	27
Lockhart River (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Lockyer Valley (R)	1	1	1	1	1	<1	<1	<1	<1	<1	1	1	1	1	1
Logan (C)	4	5	5	6	7	2	2	2	3	3	6	7	7	9	10
Longreach (R)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Mackay (R)	25	28	29	32	34	9	10	10	11	12	34	38	39	43	46
McKinlay (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

	Trailable Fleet up to 4.5 metres					Trailable Fleet 4.5 - 8 metres					Total				
	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036	2016	2021	2026	2031	2036
Mapoon (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Maranoa (R)	1	1	1	1	1	<1	<1	<1	<1	<1	1	1	1	1	1
Mareeba (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Moreton Bay (R)	28	30	33	36	38	10	11	12	13	14	38	41	45	49	52
Mornington (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Mount Isa (C)	2	2	2	2	2	1	1	1	1	1	3	3	3	3	3
Murweh (S)	1	1	1	1	1	<1	<1	<1	<1	<1	1	1	1	1	1
Napranum (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Noosa (S)	6	6	7	7	7	3	3	3	3	3	9	9	10	10	10
North Burnett (R)	1	1	1	1	1	<1	<1	<1	<1	<1	1	1	1	1	1
Northern Peninsula Area (R)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Palm Island (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Paroo (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Pormpuraaw (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Quilpie (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Redland (C)	21	22	24	27	29	9	10	11	12	13	30	32	35	39	42
Richmond (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Rockhampton (R)	11	11	12	12	13	4	4	5	5	5	15	15	17	17	18
Scenic Rim (R)	5	5	6	6	7	2	2	2	2	2	7	7	8	8	9
Somerset (R)	7	7	8	8	8	2	3	3	3	3	9	10	11	11	11
South Burnett (R)	3	3	4	4	4	1	1	1	1	1	4	4	5	5	5
Southern Downs (R)	3	3	4	4	4	1	1	2	2	2	4	4	6	6	6
Sunshine Coast (R)	21	23	26	28	31	7	8	9	10	11	28	31	35	38	42
Tablelands (R)	2	2	2	2	2	1	1	1	1	1	3	3	3	3	3
Toowoomba (R)	2	2	2	2	2	1	1	1	1	1	3	3	3	3	3
Torres (S)	<1	<1	<1	<1	<1	1	1	1	1	1	1	1	1	1	1
Torres Strait Island (R)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Townsville (C)	20	21	23	25	29	9	10	11	12	13	29	31	34	37	42
Weipa (T)	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2
Western Downs (R)	2	2	2	2	3	1	1	1	1	1	3	3	3	3	4
Whitsunday (R)	17	18	19	20	22	8	10	10	11	11	25	28	29	31	33
Winton (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Woorabinda (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Wujal Wujal (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Yarrabah (S)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
<b>Total</b>	<b>401</b>	<b>425</b>	<b>464</b>	<b>496</b>	<b>536</b>	<b>162</b>	<b>176</b>	<b>190</b>	<b>207</b>	<b>221</b>	<b>563</b>	<b>601</b>	<b>654</b>	<b>703</b>	<b>757</b>

Note: Economic Associates estimates, derived from Table 3.3

### 3.5 Projected pontoon/landing demand

In Queensland, total pontoon/landing demand is projected to increase from 87 pontoons/landings in 2016 to 121 pontoons/landings in 2036.

The LGAs anticipated to have the most significant demand for pontoons/landings are Gold Coast City, Brisbane City, Redland City, Sunshine Coast Regional Council, Cairns Regional Council, Fraser Coast Regional Council and Whitsunday Regional Council.

Table 3.5 below summarises the projected pontoon/landing demand by LGA between 2016 and 2036.

**Table 3.5: Projected pontoon / landing demand by LGA, 2016-2036**

	2016	2021	2026	2031	2036
Aurukun (S)	0	0	0	0	0
Balonne (S)	0	0	0	0	0
Banana (S)	0	0	0	0	0
Barcaldine (R)	0	0	0	0	0
Barcoo (S)	0	0	0	0	0
Blackall-Tambo (R)	0	0	0	0	0
Boulia (S)	0	0	0	0	0
Brisbane (C)	8	9	9	10	11
Bulloo (S)	0	0	0	0	0
Bundaberg (R)	3	3	3	3	3
Burdekin (S)	1	1	1	1	1
Burke (S)	<1	<1	<1	<1	<1
Cairns (R)	6	7	7	8	8
Carpentaria (S)	<1	<1	<1	<1	<1
Cassowary Coast (R)	3	3	3	3	3
Central Highlands (R)	0	0	0	0	0
Charters Towers (R)	0	0	0	0	0
Cherbourg (S)	0	0	0	0	0
Cloncurry (S)	0	0	0	0	0
Cook (S)	<1	<1	<1	<1	<1
Croydon (S)	0	0	0	0	0
Diamantina (S)	0	0	0	0	0
Doomadgee (S)	0	0	0	0	0
Douglas (S)	2	2	2	2	2
Etheridge (S)	0	0	0	0	0
Flinders (S)	0	0	0	0	0
Fraser Coast (R)	6	6	7	7	8
Gladstone (R)	3	3	3	4	4
Gold Coast (C)	14	16	18	20	22
Goondiwindi (R)	0	0	0	0	0
Gympie (R)	1	1	1	1	2
Hinchinbrook (S)	2	2	2	2	2
Hope Vale (S)	<1	<1	<1	<1	<1
Ipswich (C)	<1	<1	<1	<1	<1
Isaac (R)	1	1	1	1	1
Kowanyama (S)	0	0	0	0	0
Livingstone (S)	4	4	4	6	6
Lockhart River (S)	<1	<1	<1	<1	<1
Lockyer Valley (R)	0	0	0	0	0
Logan (C)	<1	<1	<1	<1	<1
Longreach (R)	0	0	0	0	0
Mackay (R)	4	4	6	6	6
McKinlay (S)	0	0	0	0	0
Mapoon (S)	0	0	0	0	0

	2016	2021	2026	2031	2036
Maranoa (R)	0	0	0	0	0
Mareeba (S)	0	0	0	0	0
Moreton Bay (R)	6	6	7	8	8
Mornington (S)	<1	<1	<1	<1	<1
Mount Isa (C)	0	0	0	0	0
Murweh (S)	0	0	0	0	0
Napranum (S)	0	0	0	0	0
Noosa (S)	1	1	2	2	2
North Burnett (R)	0	0	0	0	0
Northern Peninsula Area (R)	<1	<1	<1	<1	<1
Palm Island (S)	<1	<1	<1	<1	<1
Paroo (S)	0	0	0	0	0
Porpuraaw (S)	0	0	0	0	0
Quilpie (S)	0	0	0	0	0
Redland (C)	6	6	7	7	8
Richmond (S)	0	0	0	0	0
Rockhampton (R)	2	2	2	2	3
Scenic Rim (R)	0	0	0	0	0
Somerset (R)	0	0	0	0	0
South Burnett (R)	0	0	0	0	0
Southern Downs (R)	0	0	0	0	0
Sunshine Coast (R)	4	5	5	6	6
Tablelands (R)	0	0	0	0	0
Toowoomba (R)	0	0	0	0	0
Torres (S)	<1	<1	<1	<1	<1
Torres Strait Island (R)	<1	<1	<1	<1	<1
Townsville (C)	4	4	6	6	7
Weipa (T)	<1	<1	<1	<1	<1
Western Downs (R)	0	0	0	0	0
Whitsunday (R)	6	7	7	8	8
Winton (S)	0	0	0	0	0
Woorabinda (S)	0	0	0	0	0
Wujal Wujal (S)	0	0	0	0	0
Yarrabah (S)	<1	<1	<1	<1	<1
<b>Total</b>	<b>87</b>	<b>93</b>	<b>103</b>	<b>113</b>	<b>121</b>

Source: Economic Associates estimates, derived from Table 3.3



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## APPENDIX A

# DISTRIBUTION OF BOAT REGISTRATIONS TO LGAS OF USE





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