

# CAIRNS SHIPPING DEVELOPMENT PROJECT

## Revised Draft Environmental Impact Statement

### APPENDIX G: Shipping Simulation Report





# Port of Cairns

Cruise Shipping Development Strategy

## Channel Development

Further Simulation exercises October 12-13<sup>th</sup> 2015

## Simulation Results

Smartship Brisbane

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## Document control sheet

### Contact for enquiries and proposed changes

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### Version history

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1.0	21/10/2013	Captain Michael Barnett	Initial draft.
1.1	23/10/2013	Captain Michael Barnett	Final
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### Document sign off

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# 1 Background

In 2015 Ports North EIS for the Cairns Shipping Channel was completed. Following scrutiny of the EIS it was resolved that further simulation studies should be conducted to explore the reduction of dredge volumes with a view to on shore disposal. Ports North commissioned MSQ Regional Harbourmaster and MSQ Pilots to undertake further simulation of various cruise liner models in the Cairns Channel at Smartship, Brisbane

This further simulation targeted Vista and Grand Class vessels using the existing channel with some widening at the bend in the vicinity of Beacon 18-29 and between Beacons 11-15. (This is called Option 4) The simulation was to target reduced capital expenditure but not at the cost of safety.

## 1.1 Channel Design

The existing channel has an entrance channel aligned 209.2 / 029.2° and length of 5.3 nautical miles (nm) and an inner (Trinity) channel aligned 192.9 / 012.9° of 1.8 nm in length from beacon C20 to Cairns number 12 wharf. The Cruise Ship (Crystal) swing basin is positioned off wharf numbers 1 and 2 and is 380 M in diameter.

The alignment of the modelled channels are unchanged to Beacon 15 when a new alignment of 211/031° is set before resuming the 192.9 / 012.9° alignment, in the vicinity of Beacon 20, for the Inner Channel.

The channel widens to 100m between Beacons 11-15 and then widens to 180m at Beacon 20 and then reduces to 110m wide into the Inner Channel. These channels use a batter slope of 1:4 the design depth remains at -8.3m LAT. The Inner Channel clearance from the Marina is reduced from 75m to 55m.

### 1.1.1 Under Keel Clearance

	Channel	Swing Basin	Alongside
Upto 90,000 GT	1.5 m	0.6m	0.3m
Over 90,000 GT	2.0m	0.6m	0.3m

## 1.2 Ship Models

The target cruise vessels for the simulation Vista and Grand class.

### 1.2.1 Vista Class

Queen Victoria (90,049 Gross Tonnage, 294.00 M LOA x 32.26 M MB x 8.00 M D, Twin Azipod propulsion units and three bow thrusters);

### 1.2.2 Grand Class

Emerald Princess (113,561 Gross Tonnage, 290m LOA x 36.05 M MB x 8.50M D, Twin Screw, Twin Rudders, three thrusters fore and aft)

## 2 Purpose and Objectives of Simulation

### 2.1 Purpose/Objective

The purpose of the simulation was test the action of the vessels in the existing channel, with minor widening and under weather and tidal conditions gathered for the EIS process

## 3 Simulation

### 3.1 Location

The simulation was conducted at Smartship Australia Simulator Centre, Brisbane from 7-8 October 2013

### 3.2 Participating Parties and Persons

#### For Ports North

Alan Vico	General Manager Planning and Projects	(AV)
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#### For Maritime Safety Queensland (MSQ)

Captain Michael Barnett	Regional Harbour Master (Cairns)	(MB)
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Captain Trond Kildal	Pilot Manager (Cairns)	(TK)
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Captain Pars Fridolf	Assistant Pilot Manager (Cairns)	(PF)
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#### For Smartship Australia

Captain Peter Listrup	Director/Senior Instructor	(PL)
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Captain Antonio Di Lieto	Senior Instructor	(AL)
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Hugh Ferrar	Systems & Technical Manager	(HF)
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Captain Peter Lamb	Helmsman	
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## 4 Methodology

The study consisted of real time, full mission simulation of selected cruise ships arriving and departing the port of Cairns safely in prevailing conditions and the swept path not encroaching beyond set parameters.

### 4.1 Simulations

Simulations were planned to ensure all two design ships were properly assessed under normal and more extreme seasonal conditions. Run lists were created on each occasion to ensure all conditions, requirements and comments were captured.

### 4.2 Definition of Safe Navigation

The assessment of safe navigation in these simulations was determined by measuring each ship to ensure it remained within the limits and criteria as determined in the following three categories.

#### 4.2.1 Ships Position in the Fairway

The safe navigational criteria and limits set for this category were:-

##### 4.2.1.1 Ships Swept Path

Not to encroach within half beam width (approx 17m) of the channel toe lines

##### 4.2.1.2 Maximum Increase in Draft

Total maximum allowable increase in draft	= 1.4 M
Maximum increase due to heeling	= 1.0 M
Maximum increase due to squat	= 1.0 M

#### 4.2.2 Use of Ships Internal Forces

The criteria and limits set for this category were:-

##### 4.2.2.1 Speed

Speed in the channel was limited to a steady 10 knots and up to 12 knots for necessary corrections.

##### 4.2.2.2 Use of Rudder

Use of the rudder was limited to an effective 30 degrees. Periods of 60 seconds in this position (30 degrees) was considered to be outside safe limits.

##### 4.2.2.3 Use of Engines/Propulsion

Use of engines/propulsion limited to provide agreed safe speeds. Periods of 60 seconds in excess of this amount was considered to be outside safe limits.

##### 4.2.2.4 Use of Thrusters

The use of thrusters was limited to manoeuvring off the berth



### 4.2.3 Ship Operators Navigational Risk Assessment

This is a subjective assessment of a particular run or ship made by the Pilot, Observer and if necessary the Instructor based on their practical experience of the ship and port.

## 4.3 Environmental Effects

These effects were based on seasonal normal conditions known to affect the port of Cairns.

### 4.3.1 Normal Conditions

Wind	20 knots gusting 25 knots from SE
Or	30 knots gusting 35 knots from SE (see run sheet)
Current (Wind)	0.5 knots @ fairway to NW/SE
Current (Tidal)	2.0 knots maximum on Flood and Ebb tide unless stated on run sheet
Current (Cross)	0.2 knots @ channel bn. 5 to 9 Influence from Barron River

## 5 Assessment

(In addition to this report the Simulation Assessment Report from Smartship Australia should be consulted – in particular the Pilot Comments on each Run Sheet)

This is the fourth simulation exercise and the first when the environmental conditions from the EIS and hydrographic data has been built into the model.

Since 2007 considerable experience has been gained by the Pilots handling the “Rhapsody of the Seas” during more than 30 calls and in addition the number of runs using the cruise liner models is now in excess of 100 resulting in mature experience curve for the pilots

Initial runs with the Vista Class indicated some steering problems in the channel between beacons 11-15 where the shallow water is very close to the channel on the North side. The model was modified by widening the channel on the this side to a width of 100m with a 1 in 4 batter up to adjacent natural seabed which gave much better steering.

The simulation exercises were initially run using a UKC of 1.5m in the channel with a depth of -8.3m LAT. This required a height of tide of 1.2m for Vista however after the first runs a UKC of 2.0m was used as steering required a lot of helm – height of tide was increased to 1.7m. Required height of tide for Grand Class for 2.0m UKC was 2.2m.

To ensure access to the port on a consistent basis that would make “homeporting” viable a tidal window analysis should be undertaken by Ports North to determine any required deepening of the channel