

Risk Register - Supplementary EIS

Project name:	Townsville Ocean Terminal
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Date created: 16 Mar 07
Date revised: 04 Jul 08

Reference	Risk	Potential consequences	Original Risk			Proposed risk treatment	Residual Risk			Position taken	Rationale
			Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating		
3	Part A: TCC Risk Assessment									Response to TCC Assessment	
4.1	Climate										
CL1	Strong winds caused by tropical cyclones or low pressure systems	Injury or death. Destruction/damage to buildings and infrastructure.	Possible	Major	High	Building and infrastructure designed to withstand extreme weather. Design category for cyclone rating and breakwaters and land masses designed for Q100 event. Construction Phase Disaster Action Plan includes early warnings for evacuation of personnel and equipment.	Possible	Major	High		
		TCC Assessment:	Likely	Catastrophic	Extreme		Likely	Catastrophic	Extreme	Refuted	No justification given proposed risk treatment measures.
CL2	Flooding caused by storm surge	Destruction/damage to buildings and infrastructure	Possible	Major	High	Building and infrastructure designed to withstand extreme weather. Disaster Action Plan. TOT Emergency Plan.	Possible	Minor	Low		
		TCC Assessment:	Likely	Catastrophic	Extreme		Likely	Catastrophic	Extreme	Refuted	No justification given proposed risk treatment measures.
CL3	Flooding caused by heavy rainfall	Destruction/damage to buildings and infrastructure	Possible	Major	High	Building and infrastructure designed to withstand extreme weather. Disaster Action Plan. TOT Emergency Plan.	Possible	Minor	Low		
		TCC Assessment:	Rare	Major	High		Rare	Minor	Low	No change	No nett change in residual risk rating.
CL4	Insufficient allowance for increased sea levels due to climate change	Destruction/damage to buildings and infrastructure	Possible	Major	High	Design allowance for water level rise caused by climate change.	Possible	Minor	Low		Note: Risk better defined.
		TCC Assessment:	Almost Certain	Major	Extreme		Almost Certain	Minor	High	Refuted	No justification given proposed risk treatment measures.
CL5	Increased frequency and intensity of cyclones due to climate change	Destruction/damage to buildings and infrastructure	Possible	Major	High	Building and infrastructure designed to withstand extreme weather. Disaster Action Plan.	Possible	Major	High		
		TCC Assessment:	Possible	Catastrophic	Extreme		Possible	Moderate	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
4.2	Land										
LA1	Degradation of water quality due to erosion	Degradation of water quality	Possible	Minor	Low	Site fully stabilised and landscaped.	Possible	Minor	Moderate		
		TCC Assessment:	Likely	Minor	High		Unlikely	Minor	Low	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Negligible.
LA3	Degradation of water quality due to existing contaminants in sediment	Degradation of water quality	Possible	Moderate	Moderate	Annual monitoring and maintenance dredging.	Possible	Moderate	Moderate		
		TCC Assessment:	Possible	Minor	Moderate		Possible	Minor	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
LA8	Slow consolidation of stockpiled ooze in parkland area	Delay in release of park area of project	Possible	Moderate	Moderate	Site fully stabilised and landscaped.	Possible	Minor	Low		
		TCC Assessment:	Likely	Minor	High		Unlikely	Minor	Low	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Negligible.
4.3	Traffic and Transport										
TT4	Degradation of traffic and transport infrastructure	Damage to infrastructure	Possible	Moderate	Moderate	Remediation or repair to damaged infrastructure	Possible	Moderate	Moderate		
		TCC Assessment:	Possible	Moderate	Moderate		Possible	Moderate	Moderate	No change	No nett change in residual risk rating.
TT6	Increased operational traffic requires building of bridge	Major cost of contribution to bridge	Possible	Major	High	Negotiations to be undertaken with TCC to determine required contribution	Possible	Moderate	Moderate		
		TCC Assessment:	Possible	Major	High		Possible	Moderate	Moderate	No change	No nett change in residual risk rating.
4.4	Non-transport infrastructure										
IN3	Lighting insufficient for safe operation of Terminal	Infrastructure upgrade required	Rare	Insignificant	Negligible	Design loadings calculated and sufficient capacity included in design (lumen levels)	Unlikely	Insignificant	Negligible		
		TCC Assessment:	Rare	Minor	Low		Rare	Insignificant	Low	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Negligible.
IN4	Unintended discharge of ballast water	Possible issue for investigation	Unlikely	Major	Moderate	Emergency Management	Unlikely	Major	Moderate		
		TCC Assessment:	Possible	Minor	Moderate		Possible	Minor	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
IN6	Reduction in water quality caused by stormwater runoff	Degradation of water quality	Unlikely	Moderate	Low	Stormwater management plan prepared to ensure water quality objectives are achieved	Unlikely	Minor	Negligible		
		TCC Assessment:	Possible	Minor	Moderate		Unlikely	Minor	Low	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Negligible.

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3	Part A: TCC Risk Assessment									Response to TCC Assessment	
4.5	Waste										
WA2	Excessive material and services resources use during operation	Depletion of natural resources	Possible	Major	High	Waste recycling and energy and water saving strategies required by Council (Sustainable Housing Policy)	Possible	Minor	Low		
		TCC Assessment:	Almost Certain	Moderate	Extreme		Likely	Moderate	High	Refuted	Statutory requirement.
WA3	Emission of liquid wastes to waterways due to poor practices in waste containment, waste transport and stormwater control	Deterioration of water quality and ecological values in aquatic ecosystems	Possible	Moderate	Moderate	Stormwater management and waste minimisation management in accordance with EMP	Unlikely	Minor	Negligible		
		TCC Assessment:	Likely	Minor	High		Possible	Minor	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
WA4	Emission of solid wastes to land due to poor practices in waste containment, waste transport and stormwater control	Recreational and amenity impacts	Possible	Moderate	Moderate	Waste minimisation and management practices for storage and disposal of solid waste in accordance with the project EMP	Unlikely	Minor	Negligible		
		TCC Assessment:	Possible	Moderate	High		Possible	Moderate	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
WA6	Emission of gaseous and odorous substances to air due to poor practices in TOT Precinct	Human health and odour nuisance impacts	Possible	Moderate	Moderate	Air quality control measures during operation of the TOT in accordance with HAZMAT	Possible	Minor	Low		
		TCC Assessment:	Possible	Moderate	High		Unlikely	Moderate	Moderate	Refuted	Statutory requirement.
4.6	Water Resources										
WR1	Reduction in water quality due to inadequate flushing	Localised eutrophic and/or anoxic conditions causing loss of benthic organisms	Likely	Minor	Moderate	Extensive modelling and flushing studies to gain satisfactory water turnover to negate	Unlikely	Minor	Negligible		
		TCC Assessment:	Possible	Minor	Moderate		Unlikely	Moderate	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
WR2	Reduction in water quality due to inadequate flushing	Localised loss of seagrasses	Likely	Moderate	High	Extensive modelling and flushing studies to gain satisfactory water turnover to negate	Unlikely	Moderate	Low		
		TCC Assessment:	Possible	Minor	Moderate		Unlikely	Minor	Low	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Negligible.
WR3	Reduction in water quality due to inadequate flushing	Reductions in food or habitat quality	Likely	Moderate	High	Extensive modelling and flushing studies to gain satisfactory water turnover to negate	Rare	Insignificant	Negligible		
		TCC Assessment:	Possible	Minor	Moderate		Unlikely	Minor	Low	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Negligible.
WR4	Reduction in water quality due to inadequate flushing	Localised eutrophic conditions and/or algal blooms causing fish toxicity or population declines in recreational fishing area. Possible human health impacts. Negative public perception and National publicity	Likely	Major	Extreme	Extensive modelling and flushing studies to gain satisfactory water turnover to negate	Unlikely	Moderate	Low		
		TCC Assessment:	Possible	Moderate	High		Unlikely	Moderate	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
WR5	Reduction in water quality due to inadequate flushing	Algal blooms almost certain, resulting in reduced amenity, potentially harmful to human contact, toxicity for seagrasses, benthos, fish and protected species, negative public perception on an international scale	Almost Certain	Catastrophic	Extreme	Extensive modelling and flushing studies to gain satisfactory water turnover to negate	Unlikely	Moderate	Low		
		TCC Assessment:	Possible	Moderate	High		Unlikely	Moderate	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
4.7	Coastal Resources										
CE1	Extreme Storm Tide Event - to 100 year ARI	Destruction/damage to buildings and infrastructure	Likely	Major	High	The 100 year ARI is the "Designated Storm Tide Event" (as defined by EPA). Habitable buildings, evacuation routes, essential infrastructure are therefore located above 100 year ARI level	Possible	Minor	Low		
		TCC Assessment:	Almost Certain	Catastrophic	Extreme		Almost Certain	Moderate	Extreme	Refuted	No justification given proposed risk treatment measures.
CE2	Extreme Storm Tide Event - greater than 100 year ARI	Destruction/damage to buildings and infrastructure	Rare	Catastrophic	Moderate	Incorporate with local disaster mitigation / emergency response plans	Rare	Catastrophic	Moderate		
		TCC Assessment:	Almost Certain	Catastrophic	Extreme		Almost Certain	Catastrophic	Extreme	Refuted	No justification for Almost Certain Likelihood.

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3	Part A: TCC Risk Assessment									Response to TCC Assessment	
CE3	Extreme Waves - to 100 year ARI	Destruction/damage to buildings and infrastructure	Likely	Major	High	Marine infrastructure structurally designed to accommodate 100 year ARI cyclone waves with minimal damage. Habitable buildings, evacuation routes, essential infrastructure are therefore located above 100 year ARI level	Possible	Moderate	Moderate		
		TCC Assessment:	Almost Certain	Catastrophic	Extreme		Almost Certain	Catastrophic	Extreme	Refuted	No justification given proposed risk treatment measures.
CE4	Hydrogeomorphological changes	Modification of habitat and coastal alignment	Rare	Insignificant	Negligible	Modelling undertaken to determine potential changes	Rare	Insignificant	Negligible		
		TCC Assessment:	Almost Certain	Moderate	Extreme		Almost Certain	Moderate	Extreme	Refuted	No justification for Almost Certain Likelihood.
CE5	Climate change not addressed in the design adequately		Possible	Moderate	Major	Design considered latest world climate change data. Developable land levels have been set greater than recommended levels.	Rare	Minor	Negligible		Risk redefined
		TCC Assessment:	Almost Certain	Major	Extreme		Almost Certain	Major	Extreme	Refuted	No justification given proposed risk treatment measures.
CE6	Extreme Waves - greater than 100 year ARI	Destruction/damage to buildings and infrastructure	Rare	Catastrophic	Moderate	Marine infrastructure structurally designed to accommodate 100 year ARI cyclone waves with minimal damage. Incorporate with local disaster mitigation / emergency response plans.	Rare	Catastrophic	Moderate		
		TCC Assessment:	Almost Certain	Catastrophic	Extreme		Almost Certain	Catastrophic	Extreme	Refuted	No justification for Almost Certain Likelihood.
CE7	Breakwater failure	Destruction/damage to buildings and infrastructure	Rare	Major	Low	Breakwaters structurally designed to accommodate 100 year ARI cyclone waves with minimal damage. Locate essential infrastructure & habitable buildings back from high impact zone in the event of breakwater failure. Incorporate with local disaster mitigation / emergency response plans.	Rare	Major	Low		
		TCC Assessment:	Possible	Major	Extreme		Possible	Major	Extreme	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to High.
CE8	Adjacent shorelines	modification to wave climate & shoreline alignment	Almost Certain	Insignificant	Moderate	Extensive modelling and monitoring to predict and detect changes. Minor remediation as required.	Likely	Insignificant	Low		
		TCC Assessment:	Almost Certain	Moderate	Extreme		Almost Certain	Minor	Extreme	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to High.
4.8	Air										
AI1	Emission of gaseous pollutants from existing and future Port of Townsville operations	Health impacts on future residents of Breakwater Cove	Unlikely	Major	Moderate	Design of future residences to prevent entry of airborne pollutants as directed by the Port Protection Agreement.	Unlikely	Major	Moderate		
		TCC Assessment:	Almost Certain	Major	Extreme		Almost Certain	Moderate	Extreme	Refuted	No justification given proposed risk treatment measures.
AI2	Emission of fine particulate matter from existing and future Port of Townsville operations	Amenity impacts on future residents of Breakwater Cove	Unlikely	Moderate	Low	Design of future residences to allow refuge from dust..	Unlikely	Moderate	Low		
		TCC Assessment:	Almost Certain	Major	Extreme		Almost Certain	Moderate	Extreme	Refuted	No justification given proposed risk treatment measures.
AI3	Emission of odorous substances from existing and future Port of Townsville operations	Amenity impacts on future residents of Breakwater Cove	Possible	Moderate	Moderate	Design of future residences to allow refuge from odour.	Possible	Moderate	Moderate		
		TCC Assessment:	Almost Certain	Major	Extreme		Almost Certain	Moderate	Extreme	Refuted	No justification given proposed risk treatment measures.
AI4	Emissions of air pollutants from operation of the TOT	Health and amenity impacts on future residents of Breakwater Cove	Unlikely	Major	Moderate	Design of TOT infrastructure and operational air control measures to prevent release of airborne pollutants as directed by the Port Protection Agreement.	Unlikely	Major	Moderate		
		TCC Assessment:	Possible	Moderate	High		Unlikely	Moderate	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
4.9	Visual Amenity and Lighting										
VL1	No Risks Identified				#N/A				#N/A		

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3	Part A: TCC Risk Assessment									Response to TCC Assessment	
4.10	Noise and Vibration										
	Operational Noise										
NV1	Noise from existing and future Port Operations impacting on Breakwater Cove.	Unreasonable noise impact on residences within Breakwater Cove precinct.	Unlikely	Moderate	Low	Appropriate design of future residential development within Breakwater Cove Precinct to allow refuge from excessive noise.	Unlikely	Minor	Negligible		
		TCC Assessment:	Almost Certain	Moderate	Extreme		Almost Certain	Moderate	Extreme	Refuted	No justification given proposed risk treatment measures.
NV2	Noise from naval and cruise ships impacting on Breakwater Cove residents.	Unreasonable noise impact on Breakwater Cove residences	Unlikely	Moderate	Low	Appropriate design of future residential development with Breakwater Cove Precinct; Appropriate design of TOT building facilities.	Unlikely	Minor	Negligible		
		TCC Assessment:	Likely	Minor	High		Likely	Minor	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
NV3	Noise from naval and cruise ships impacting on existing receivers	Unreasonable noise impact on existing receivers.	Unlikely	Insignificant	Negligible	Acoustic barrier and berm planned and design of future residential development provides refuge from infrequent excessive noise.	Unlikely	Insignificant	Negligible		
		TCC Assessment:	Likely	Minor	High		Likely	Minor	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
NV4	Noise from naval and cruise ships impacting on marine animals	Physical and behavioural impacts on mammals	Possible	Major	High	No specific short-term mitigation	Possible	Minor	Low		
		TCC Assessment:	Rare	Minor	Low		Rare	Minor	Low	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Negligible.
NV5	Operational road traffic noise impact from TOT on residences along public roads	Unreasonable increase in road traffic noise levels, degradation of existing noise environment	Unlikely	Moderate	Low	No specific mitigation. Increase in operational road traffic noise is unlikely to be noticeable.	Unlikely	Minor	Negligible		
		TCC Assessment:	Likely	Moderate	High		Likely	Moderate	High	Refuted	No justification for High risk rating.
4.11	Nature Conservation										
NC1	Sediment destabilisation through changes in sediment transport regime (e.g. dredging in adjacent areas)	Seagrass impacts	Possible	Major	High	Use of silt curtains during dredging and dredge protocols contained in project EMP	Possible	Minor	Low		
		TCC Assessment:	Possible	Major	Extreme		Unlikely	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
NC2	Light attenuation through, for example, increased turbidity associated with dredging activities	Seagrass impacts	Possible	Major	High	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Possible	Minor	Low		
		TCC Assessment:	Possible	Major	Extreme		Possible	Major	Extreme	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to High.
NC3	Nutrient enrichment leading to increased macroalgal growth (e.g. effluent discharge)	Seagrass impacts	Unlikely	Major	Moderate	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Moderate	Low		
		TCC Assessment:	Possible	Major	Extreme		Unlikely	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
NC4	Contamination from spill (oil, chemicals)	Seagrass impacts	Possible	Major	High	Spill contingency procedures contained in project EMP. Controlled via fully bunded site.	Unlikely	Minor	Negligible		
		TCC Assessment:	Possible	Major	Extreme		Possible	Major	Extreme	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to High.
NC5	Contamination from disturbed contaminated sediments	Seagrass impacts	Unlikely	Major	Moderate	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Minor	Negligible		
		TCC Assessment:	Possible	Major	Extreme		Possible	Major	Extreme	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to High.
NC6	Noise pollution (impact on organisms relying on seagrass beds)	Seagrass impacts	Almost Certain	Major	Extreme	Visual survey of site to detect noise sensitive species prior to commencement of construction works. Dispersal of noise sensitive species using motorised vessel.	Possible	Moderate	Moderate		
		TCC Assessment:	Possible	Major	Extreme		Possible	Major	Extreme	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to High.
NC7	Smothering through garbage and debris accumulation	Seagrass impacts	Unlikely	Major	Moderate	Waste control measures contained in project EMP.	Unlikely	Moderate	Low		
		TCC Assessment:	Possible	Major	Extreme		Unlikely	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.

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3	Part A: TCC Risk Assessment									Response to TCC Assessment	
NC8	Marine pest incursion	Seagrass impacts	Unlikely	Major	Moderate	Control on ballast discharge in accordance with AQIS requirements	Unlikely	Moderate	Low		
		TCC Assessment:	Unlikely	Major	High		Rare	Major	High	Refuted	Regulatory requirement. Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
NC9	Light attenuation through turbidity	Coral reef impacts	Possible	Major	High	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Possible	Minor	Low		
		TCC Assessment:	Possible	Major	Extreme		Unlikely	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
NC10	Sediment deposition	Coral reef impacts	Possible	Major	High	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Possible	Moderate	Moderate		
		TCC Assessment:	Possible	Major	Extreme		Unlikely	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
NC11	Nutrient enrichment leading to increased macroalgal growth	Coral reef impacts	Unlikely	Major	Moderate	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Moderate	Low		
		TCC Assessment:	Unlikely	Major	High		Rare	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
NC12	Contamination and mortality from spill (oil, chemicals)	Coral reef impacts	Possible	Major	High	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Minor	Negligible		
		TCC Assessment:	Possible	Major	Extreme		Rare	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
NC13	Contamination from disturbed contaminated sediments	Coral reef impacts	Unlikely	Major	Moderate	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Minor	Negligible		
		TCC Assessment:	Unlikely	Major	High		Rare	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
NC14	Smothering through garbage and debris accumulation	Coral reef impacts	Unlikely	Moderate	Low	Waste control measures contained in project EMP.	Unlikely	Moderate	Low		
		TCC Assessment:	Unlikely	Moderate	Moderate		Rare	Moderate	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Negligible.
NC15	Marine pest incursion	Coral reef impacts	Unlikely	Moderate	Low	Control on ballast discharge in accordance with AQIS requirements	Unlikely	Moderate	Low		
		TCC Assessment:	Unlikely	Moderate	Moderate		Rare	Moderate	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Negligible.
NC16	Sediment deposition / burial	Benthic community impacts	Possible	Minor	Low	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Minor	Negligible		
		TCC Assessment:	Possible	Moderate	High		Unlikely	Moderate	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
NC17	Nutrient enrichment leading to increased macroalgal growth	Benthic community impacts	Unlikely	Minor	Negligible	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Minor	Negligible		
		TCC Assessment:	Possible	Moderate	High		Possible	Moderate	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
NC18	Contamination and mortality from spill (oil, chemicals)	Benthic community impacts	Possible	Moderate	Moderate	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Minor	Negligible		
		TCC Assessment:	Possible	Moderate	High		Possible	Moderate	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
NC19	Contamination from disturbed contaminated sediments	Benthic community impacts	Unlikely	Moderate	Low	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Minor	Negligible		
		TCC Assessment:	Possible	Moderate	High		Unlikely	Moderate	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
NC20	Reduction in predator populations	Benthic community impacts	Unlikely	Moderate	Low	No specific mitigation.	Unlikely	Moderate	Low		
		TCC Assessment:	Possible	Moderate	High		Possible	Moderate	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.

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			Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating		
3	Part A: TCC Risk Assessment									Response to TCC Assessment	
NC21	Smothering through garbage and debris accumulation	Benthic community impacts	Unlikely	Moderate	Low	Waste control measures contained in project EMP.	Unlikely	Moderate	Low		
		TCC Assessment:	Unlikely	Moderate	Moderate		Rare	Moderate	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Negligible.
NC22	Effects of reduction in water quality	Fish and fisheries impacts	Possible	Moderate	Moderate	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Moderate	Low		
		TCC Assessment:	Possible	Moderate	High		Unlikely	Moderate	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
NC23	Impacts on food resources (e.g. benthic communities)	Fish and fisheries impacts	Possible	Major	High	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Moderate	Low		
		TCC Assessment:	Possible	Major	Extreme		Unlikely	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
NC24	Contamination and mortality from spill (oil, chemicals)	Fish and fisheries impacts	Possible	Major	High	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Minor	Negligible		
		TCC Assessment:	Possible	Major	Extreme		Unlikely	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
NC25	Noise pollution (impact on organisms relying on seagrass beds)	Fish and fisheries impacts	Almost Certain	Minor	High	Visual survey of site to detect noise sensitive species prior to commencement of construction works. Dispersal of noise sensitive species using motorised vessel.	Possible	Minor	Low		
		TCC Assessment:	Almost Certain	Minor	High		Almost Certain	Minor	High	Refuted	No justification given proposed risk treatment measures.
NC26	Disturbance to breeding and nursery habitats	Fish and fisheries impacts	Likely	Moderate	High	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Possible	Moderate	Moderate		
		TCC Assessment:	Likely	Moderate	High		Possible	Moderate	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
NC27	Increased fishing pressure (operation phase)	Fish and fisheries impacts	Likely	Moderate	High	Restrictions by Marine park zoning and licensing.	Unlikely	Moderate	Low		
		TCC Assessment:	Likely	Insignificant	Moderate		Likely	Insignificant	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
NC28	Smothering of habitat through garbage and debris accumulation	Fish and fisheries impacts	Unlikely	Moderate	Low	Waste control measures contained in project EMP.	Unlikely	Moderate	Low		
		TCC Assessment:	Unlikely	Moderate	Moderate		Rare	Moderate	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Negligible.
NC29	Hazard to fisheries through accumulated garbage	Fish and fisheries impacts	Unlikely	Major	Moderate	Waste control measures contained in project EMP.	Unlikely	Moderate	Low		
		TCC Assessment:	Unlikely	Major	High		Rare	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
NC30	Marine pest incursion	Fish and fisheries impacts	Unlikely	Major	Moderate	Control on ballast discharge in accordance with AQIS requirements	Unlikely	Moderate	Low		
		TCC Assessment:	Unlikely	Major	High		Rare	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
NC31	Effects of reduction in water quality	Impacts on Bowling Green Bay	Unlikely	Moderate	Low	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Moderate	Low		
		TCC Assessment:	Rare	Insignificant	Low		Rare	Insignificant	Low	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Negligible.
NC32	Contamination and mortality from spill (oil, chemicals)	Impacts on Bowling Green Bay	Unlikely	Major	Moderate	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Minor	Negligible		
		TCC Assessment:	Rare	Insignificant	Low		Rare	Insignificant	Low	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Negligible.

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Project name:	Townsville Ocean Terminal
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Date created: 16 Mar 07
Date revised: 04 Jul 08

Reference	Risk	Potential consequences	Original Risk			Proposed risk treatment	Residual Risk			Position taken	Rationale
			Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating		
3	Part A: TCC Risk Assessment									Response to TCC Assessment	
NC33	Noise pollution	Impacts on marine mammals and reptiles	Almost Certain	Major	Extreme	Visual survey of site to detect noise sensitive species prior to commencement of construction works. Dispersal of noise sensitive species using motorised vessel.	Possible	Moderate	Moderate		
		TCC Assessment:	Almost Certain	Major	Extreme		Almost Certain	Major	Extreme	Refuted	No justification given proposed risk treatment measures.
NC34	Increased boat strikes (operation phase)	Impacts on marine mammals and reptiles	Likely	Major	Extreme	Controls on boat speed and educational signage	Unlikely	Moderate	Low		
		TCC Assessment:	Likely	Major	Extreme		Possible	Major	Extreme	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to High.
NC35	Harmful marine debris	Impacts on marine mammals and reptiles	Likely	Major	Extreme	Waste control measures contained in project EMP and informative signage.	Possible	Moderate	Moderate		
		TCC Assessment:	Likely	Major	Extreme		Possible	Major	Extreme	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to High.
NC36	Impacts on food resources (e.g. seagrass beds)	Impacts on marine mammals and reptiles	Possible	Major	High	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Possible	Moderate	Moderate		
		TCC Assessment:	Possible	Major	Extreme		Unlikely	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
NC37	Contamination and mortality from spill (oil, chemicals)	Impacts on marine mammals and reptiles	Possible	Major	High	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Minor	Negligible		
		TCC Assessment:	Possible	Major	Extreme		Possible	Major	Extreme	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to High.
NC38	Contamination / reduction in breeding and nursery habitats	Impacts on marine mammals and reptiles	Possible	Major	High	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Possible	Moderate	Moderate		
		TCC Assessment:	Possible	Major	Extreme		Unlikely	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
NC39	Effects of reduction in water quality	Impacts on marine mammals and reptiles	Possible	Moderate	Moderate	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Moderate	Low		
		TCC Assessment:	Possible	Moderate	High		Unlikely	Moderate	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
NC40	Harmful marine debris	Protected bird species	Likely	Major	Extreme	Waste control measures contained in project EMP and informative signage.	Possible	Moderate	Moderate		
		TCC Assessment:	Likely	Major	Extreme		Possible	Major	Extreme	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to High.
NC41	Contamination / reduction of breeding areas	Protected bird species	Possible	Major	High	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Possible	Moderate	Moderate		
		TCC Assessment:	Possible	Major	Extreme		Possible	Major	Extreme	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to High.
NC42	Impact on food resources	Protected bird species	Possible	Moderate	Moderate	Use of silt curtains during dredging and dredge protocols contained in project EMP.	Unlikely	Moderate	Low		
		TCC Assessment:	Possible	Moderate	High		Possible	Moderate	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
4.12	Cultural Heritage										
	No operational risks identified				#N/A				#N/A		
4.13	Social										
SO2	Incompatible land uses	Adverse impacts on local residents due to TOT operations	Possible	Major	High	Design and construction requirements on dwellings to minimise impacts; appropriate port protection agreements and associated instruments to be put into place	Possible	Moderate	Moderate		
		TCC Assessment:	Almost Certain	Major	Extreme		Likely	Major	Extreme	Refuted	Regulatory requirement.
SO3	Increased marine traffic	Impacts on existing recreational uses	Rare	Insignificant	Negligible	Controls on boat speed and educational signage.	Rare	Insignificant	Negligible		
		TCC Assessment:	Almost Certain	Major	Extreme		Likely	Major	Extreme	Refuted	No justification given proposed risk treatment measures.
SO4	Increased vehicular traffic	Impacts on existing and future residents	Possible	Moderate	Moderate	Provide density plans as part of EIS submission to enable government authorities to plan for service upgrades with maximum lead times	Possible	Moderate	Moderate		
		TCC Assessment:	Almost Certain	Moderate	Extreme		Almost Certain	Moderate	Extreme	Refuted	No justification given proposed risk treatment measures.

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Reference	Risk	Potential consequences	Original Risk			Proposed risk treatment	Residual Risk			Position taken	Rationale
			Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating		
3	Part A: TCC Risk Assessment									Response to TCC Assessment	
SO7	Reduced public access to recreational space and facilities post construction	Restrictions on public access to locations beyond the Ocean Terminal (particularly when naval vessel is in port)	Almost Certain	Minor	High	Security considerations are paramount and public access will be strictly controlled when naval vessels are in port	Possible	Minor	Low		
		TCC Assessment:	Unlikely	Insignificant	Low		Unlikely	Insignificant	Low	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Negligible.
SO8	Increased demand for education services	Education service providers not able to meet the demand arising from additional residents	Unlikely	Moderate	Low	Provide density plans as part of EIS submission to enable government authorities to plan for service upgrades with maximum lead times	Unlikely	Moderate	Low		
		TCC Assessment:	Possible	Minor	Moderate		Possible	Minor	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
SO9	Increased demand for health services	Health service providers not able to meet the demand arising from cruise ship visitations and increased residential population	Unlikely	Major	Moderate	Provide density plans as part of EIS submission to enable government authorities to plan for service upgrades with maximum lead times	Unlikely	Major	Moderate		
		TCC Assessment:	Likely	Minor	High		Likely	Minor	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
SO10	Housing affordability barriers in the CBD to be exacerbated	Reinforcement of existing affordability barriers in CBD accommodation	Unlikely	Moderate	Low	Appropriate sale of developed product.	Unlikely	Moderate	Low		
		TCC Assessment:	Possible	Moderate	High		Possible	Moderate	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
SO12	Erosion of sense of place	Rapid population growth and demographic change resulting in social disconnectedness	Unlikely	Moderate	Low	Provision of high quality community infrastructure to allow integration with existing community and sense of ownership, integration with the Strand precinct.	Unlikely	Minor	Negligible		
		TCC Assessment:	Possible	Moderate	High		Unlikely	Moderate	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
SO13	Environmental degradation	Degradation of the marine environment in particular post construction	Unlikely	Major	Moderate	Adherence to environmental protocols contained in project EMP. Controls on boat speed and educational signage	Unlikely	Moderate	Low		
		TCC Assessment:	Possible	Moderate	High		Unlikely	Moderate	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
SO14	Increased impact on Strand	Degradation of the Strand due to increased usage	Unlikely	Moderate	Low		Unlikely	Minor	Negligible		
		TCC Assessment:	Almost Certain	Major	Extreme		Almost Certain	Major	Extreme	Refuted	No justification for Extreme risk rating.
4.14	Health and Safety										
HS1	Industrial air emissions from the Port	Health impacts on future residents of Breakwater Cove	Unlikely	Major	Moderate	Design of future residences to allow refuge. Monitoring to ensure continuing excellent Port control.	Unlikely	Major	Moderate		
		TCC Assessment:	Almost Certain	Moderate	Extreme		Likely	Moderate	High	Refuted	No justification given proposed risk treatment measures.
HS2	Industrial noise from the Port	Noise nuisance impacts on future residents of Breakwater Cove.	Possible	Moderate	Moderate	The Port has an obligation to control noise emissions from Port sources which it does effectively.	Possible	Moderate	Moderate		
		TCC Assessment:	Almost Certain	Moderate	Extreme		Almost Certain	Moderate	Extreme	Refuted	Regulatory requirement.
HS3	Public health and safety	Impacts on public H&S post construction	Unlikely	Major	Moderate	TOT operator to implement security measures including fencing, security staff and security cameras. WH&S Plan	Unlikely	Major	Moderate		
		TCC Assessment:	Unlikely	Moderate	Moderate		Unlikely	Moderate	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
HS4	Operational health and safety	Health and Safety impacts on TOT operational staff	Unlikely	Major	Moderate	TOT operator to have a WH&S Plan in place	Unlikely	Major	Moderate		
		TCC Assessment:	Unlikely	Moderate	Moderate		Rare	Moderate	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
HS5	Fire/explosion from TOT facility	dangerous goods release leading to environmental impacts, loss of property, injury or death.	Unlikely	Major	Moderate	TOT operator to prepare an Emergency Plan to detail emergency response and/or evacuation procedures. TOT operator to prepare an Operational Management Plan outlining prevention and management strategies for fire and explosion.	Unlikely	Major	Moderate		
		TCC Assessment:	Rare	Catastrophic	High		Rare	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.

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Reference	Risk	Potential consequences	Original Risk			Proposed risk treatment	Residual Risk			Position taken	Rationale
			Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating		
3	Part A: TCC Risk Assessment									Response to TCC Assessment	
HS6	Fire/explosion from major hazard facilities within Port limits	dangerous goods release leading to environmental impacts, loss of property, injury or death.	Unlikely	Major	Moderate	Operators of Major Hazard Facilities comply with obligations under the Dangerous Goods Safety Management Act 2001.	Unlikely	Major	Moderate		
		TCC Assessment:	Rare	Catastrophic	High		Rare	Catastrophic	Extreme	Refuted	No justification given proposed risk treatment measures. See Explosive Overpressure Report
HS7	Explosion at Loading/Unloading Berths from Ammonium Nitrate and Class 1 explosives	dangerous goods release leading to environmental impacts, loss of property, injury or death.	Unlikely	Catastrophic	High	Port of Townsville complies with Australian Standard AS3846 for Handling and Transportation of Dangerous Cargoes in Port Areas	Rare	Catastrophic	Moderate		
		TCC Assessment:	Rare	Catastrophic	High		Rare	Catastrophic	Extreme	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
HS8	Vessel collision within Port limits	Injury or death. Pollutant discharge leading to environmental impacts.	Unlikely	Major	Moderate	We understand the Port has emergency response plans and protocols to prevent vessel collisions	Unlikely	Moderate	Low		
		TCC Assessment:	Rare	Major	High		Rare	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
HS9	Loading/unloading incident at the TOT	Injury or death. Pollutant discharge leading to environmental impacts.	Possible	Moderate	Moderate	TOT operator to prepare an Emergency Plan to detail emergency response and/or evacuation procedures. TOT operator to prepare an Operational Management Plan outlining operational procedures.	Possible	Minor	Low		
		TCC Assessment:	Possible	Major	Extreme		Unlikely	Major	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
4.15	Economy										
EC3	Potential negative impacts on property market	Decrease in property values	Possible	Moderate	Moderate	Economic impacts are likely to be positive - high quality product.	Unlikely	Minor	Negligible		Risk and consequence redefined.
		TCC Assessment:	Possible	Minor	Moderate		Possible	Minor	Moderate	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Low.
EC4	Potential impact on future port activities	Increased environmental compliance costs to port users as a result of community complaints, specifically arising from residents of Breakwater Cove	Unlikely	Moderate	Low	Excellent environmental management of the Port set to continue coupled with implementation of Port Protection Code	Unlikely	Moderate	Low		
		TCC Assessment:	Possible	Major	Extreme		Possible	Major	Extreme	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to High.
EC6	Potential residential complaints about port activities	Regulatory or legislative changes impacting on port operating conditions	Unlikely	Moderate	Low	Excellent environmental management of the Port set to continue coupled with implementation of Port Protection Code	Unlikely	Moderate	Low		
		TCC Assessment:	Almost Certain	Major	Extreme		Almost Certain	Major	Extreme	Refuted	Regulatory requirement.
	Other										
CM7	Parklands Settlement	Destruction of Property (landscape element)	Almost Certain	Minor	High	No Specific Mitigation just Make Good	Almost Certain	Minor	High		
		TCC Assessment:	Likely	Minor	High		Likely	Minor	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
CM8	Green Topped Breakwaters	Destruction of Property	Possible	Moderate	Moderate	No Specific Mitigation just Make Good	Possible	Moderate	Moderate		
		TCC Assessment:	Possible	Moderate	High		Possible	Moderate	High	Reduced Risk	Rating skewed by methodology differences (See Section 1). Under a 5 scale rating, risk as assessed by TCC would have reduced to Moderate.
CM9	Green Topped Seawall	Destruction of Property (landscape element)	Possible	Minor	Low	No Specific Mitigation other than relocate during event and Make Good	Possible	Minor	Low		
		TCC Assessment:	Almost Certain	Moderate	Extreme		Almost Certain	Moderate	Extreme	Refuted	No justification for Extreme risk rating.

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			Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating		
4	Part C: Additional Risks identified by TCC									Response to TCC Assessment	
	Air										
AI5	Actual and perceived Emissions of odours from algal blooms and other sources related to poor flushing	Increased complaints. Reduced tourism. Public health issue. \$ Responsibility of TCC & others.	Likely	Major	Extreme				not rated		Algae bloom improbable given water quality management. Extensive studies including SEIS have created adequate data
AI6	Inadequate monitoring and investigation conducted for EIS	Uninformed and poor decision making.	Possible	Major	Extreme				not rated	Refuted	Insignificant
	Coastal										
CE9	Due to the shallow inlet into the deep canals there may be water quality and sediment issues	Potential for polluted/stratified water and possible fish kills if flushing is inadequate.	Possible	Minor	Moderate				not rated		Not relevant - inlet is not shallow compared to canals.
CE10	Sand will migrate from sections of the Strand beaches due to the alteration to wave action and currents.	Reduction in protection of public and private infrastructure. Additional cost to council for sand replenishment.	Almost Certain	Minor	High				not rated		
CE11	That the maintenance Dredging will not be carried out	Flushing will not occur and water quality will deteriorate with possible algae blooms	Almost Certain	Minor	High				not rated	Refuted	Regulatory requirement.
CE12	That the maintenance dredging will not restore the proper shape of the canal floors (The canals floor shape is imperative to ensure proper flushing)	Flushing will not occur and water quality will deteriorate with possible algae blooms	Almost Certain	Minor	High				not rated	Refuted	Regulatory requirement.
CE13	Risk to the environment from annual dredging	Any Benthic community will be destroyed and neighbouring community will be polluted and disturbed	Possible	Moderate	High	Adequate dredging management plan.	Unlikely	Moderate			
CE14	Release of sediment into Cleveland Bay (CB) ongoing (annual) dredging activities	Creates poor light attenuation in sections of CB / Environmental harm	Possible	Moderate	High	Adequate dredging management plan.	Unlikely	Moderate	not rated		
CE15	Green water over Breakwater – unable to drain away during storm event	Saltwater flooding of parkland, Street system medium density and detached housing in first "finger"	Almost Certain	Moderate	Extreme	Properly designed breakwater plus run off to the canals.	Unlikely	Moderate	not rated		
	Climate										
CL6	The public will have an expectation that the development will be protected from storm tide and wave action from storms. The proposed breakwater will be overtopped during the 100year event.	That there will be overtopping with subsequent public and private infrastructure damage, and negative media / Loss of insurance cover, TCC & State Govt could incur additional costs	Almost Certain	Major	Extreme				not rated	Refuted	See CE1.
CL7	An emergency event	Public will not be able to exit the development due to traffic congestion, infrastructure damage etc. Potential for risk to life.	Almost Certain	Major	Extreme				not rated	Refuted	DMP provides planning for emergency situations.
CL8	Ongoing sea spray from storm events	Corrosion of appliances and buildings, etc	Almost Certain	Moderate	Extreme				not rated	Refuted	Not relevant to modern design.
CL9	Climate adaptation not enforced into building design	Greater energy use	Almost Certain	Minor	High				not rated	Refuted	ESD principles to be followed.
	Construction Methodology										
CM1	Marina depth not great enough to accommodate super yachts	Yachts enter the marina and become stuck as tide recedes	Almost Certain	Insignificant	High				not rated	Refuted	Depth allows for superyachts.
	Economic										
EC7	Failure of Body Corporate to undertake maintenance and repair of assets in Land under control. Legally Council will hold the "ownership" of canals and some assets. Indemnities may not afford Council protection from cost by Body Corporate	Council become liable for rectification or become target of Media.	Possible	Major	Extreme				not rated	Refuted	Council have power to recover against Body Corporate and individual land owners.
EC9	Failure of effective implementation of port protection measures	Relocation/ closure of port. Customer complaints.	Possible	Catastrophic	Extreme				not rated	Refuted	See SO2.
EC10	TOT- Incident recovery e.g. oil spill due to additional sensitive receptors in close proximity to industrial area	Increased cost to respond and manage. (inc cleaning yacht) Environmental impact. Increase complaints public and agencies. Loss of tourism.	Possible	Moderate	High				not rated		Part of normal and effective Port management strategy.
EC11	Increased complexity of incident response – increased investigation cost due to public and political pressure	Increased cost Inappropriate response. Media attention. Inability to mitigate incident.	Possible	Moderate	High				not rated		Part of normal and effective Port management strategy.
EC12	Major natural disasters etc cause excessive maintenance to walls, parks, canal etc above and beyond normal maintenance	Responsible authority for maintenance of Breakwater, internal roads and parkland is TCC – community cost in highly vulnerable locality. Increase in insurance, building, repair costs. Competition of skilled employees.	Possible	Major	Extreme				not rated		See CE1.
EC13	Body Corporate unable to finance maintenance and structural repairs to canals, sea walls, Breakwater bridge etc.	Community outrage, TCC picks up costs. TCC unable to fund.	Possible	Moderate	High				not rated		See EC7.
EC14	Development causes shipping operations to be reduced to 7am and 7pm only. Significant financial risk to port operations – loading/unloading limitations, requirement to utilize tide movements for mooring	increased demurrage. Loss of trade. Loss of existing and or future trade.	Possible	Major	Extreme				not rated		See EC4 and EC(6) (new sheet)

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			Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating		
4	Part C: Additional Risks identified by TCC										Response to TCC Assessment
EC15	Intentions in EIS understated with regard to opening widths of bridge (Possibly 17 metres)	EIS documentation is at variance to the developer's intentions as expressed in recent meetings. In particular, proponent is considering reducing the opening width of the temporary bridge to 17 metres as opposed to 25 as stated in the EIS. This will limit ability of larger vessels to access safe anchorage in cyclone and storm events. Congestion and increased traffic control. Increased waiting times.	Likely	Minor	High				not rated		See TT3.
EC16	Inability to access or evacuate TOT & Residential precinct during incident. Improper or not implemented Disaster Mgmt Plan	Fatality/ Fatalities. Property damage. Exacerbation of incident due to slow/ delayed response time.	Possible	Catastrophic	Extreme				not rated	Refuted	See CL7.
EC17	Increased maintenance cost due to ongoing settlement in parkland	Cost for TCC to remediate	Almost Certain	Minor	High	Settlement to be calculated and provided for.	Possible	Minor	not rated		
Health and Safety											
HS10	Air pollution identified in EIS from Live Cattle and other sources	Media attention, Political intervention, Possible action against the Port and causes Health problems	Almost Certain	Moderate	Extreme				not rated		See A11.
HS13	Nuisance issues - interference with TV/radio etc	Impact on port operations due to PR issues	Possible	Minor	Moderate	US Navy operating procedures confirmed to avoid.	Unlikely	Minor	not rated		
HS14	Security issues - interference with central locking / roller doors etc	Impact on port operations due to PR issues	Possible	Minor	Moderate	US Navy operating procedures confirmed to avoid.	Unlikely	Minor	not rated		
HS15	Safety issues – interference with pacemakers etc	Impact on port operations due to PR issues	Rare	Major	High	US Navy operating procedures confirmed to avoid.	Unlikely	Minor	not rated		
HS16	Damage to property or injury to life for Breakwater Cove precinct from cyclones, fire, explosion, tidal surge, shipping accident, port activities and industrial waste spills	Loss of life and damage to property	Rare	Catastrophic	High				not rated		See CL1.
HS18	Failure of disaster Management Plan as proposed or failure to provide training etc	Loss of life	Possible	Catastrophic	Extreme	DMP input by emergency services agencies and training	Rare	Major	not rated		
HS19	No well developed egress route or alternatives compliant with AS HB 76 for evacuation	Loss of life	Almost Certain	Catastrophic	Extreme				not rated		See EC16.
HS20	Evacuation route will not have the capacity to evacuate the people in a timely manner	Loss of life	Almost Certain	Catastrophic	Extreme				not rated		
HS21	Safe Haven denied upstream by restriction from bridge during extreme weather	No discussion of bridge operating in storm events. Emergency operation procedures need to be proposed to enable vessels to move up stream to access to safe moorings as duck pond will no longer be available	Likely	Moderate	High	Under new bridge operating philosophy: bridge will default to open when not in use including storm.	Rare	Moderate	not rated		
HS22	Small craft navigation problems caused by waiting for bridge opening	Interaction with commercial vessels, other recreational vessels and bridge / Personal injury	Possible	Moderate	High				not rated		See TT21
HS23	Instability of breakwater and sea wall rock armour	Loss of life / injury	Rare	Major	High				not rated		See EC7 and EC1.
Non-Transport Infrastructure											
IN7	Breakwaters fails	Damage to infrastructure, cost, etc.	Rare	Major	High				not rated		See EC7.
IN8	Failure to implement district level energy efficiency	Increased energy costs, and emissions	Almost Certain	Moderate	Extreme	ESD approach to development design.	Unlikely	Moderate	not rated		
IN9	Inability to capture fuel spills and fire fighting effects	Environmental harm	Likely	Moderate	High				not rated		See NC12.
IN10	Insufficient TCC Infrastructure to cater for the development currently proposed as headworks payment by developer.	Augmentation of Infrastructure. Additional infrastructure not included in the current Headwork Policies: Roads (deficit \$50M) Water - \$20M Sewerage - \$20M.	Almost Certain	Major	Extreme				not rated		Subject to negotiation of an Infrastructure Agreement.
IN11	Inadequate capacity in sewage system at TCC	Installation of new Pump stations and rising mains etc which have not been allowed for in existing headworks policies. \$20M	Almost Certain	Moderate	Extreme				not rated		Subject to negotiation of an Infrastructure Agreement.
IN12	Inadequate capacity in water supply system at TCC	Installation of new delivery mains, possible reservoir upgrades etc that have not been allowed for in the existing headworks policies \$20M	Almost Certain	Moderate	Extreme				not rated		Subject to negotiation of an Infrastructure Agreement.
IN13	Implementation of chilled water / energy storage for multiple dwelling units - Opport	Defer peak load on grid	Possible	Minor	Moderate	ESD approach to development design.	Possible	Minor	Moderate		
Land											
LA9	Incompatible Land Use causes relocation of port or down grading of operations	Resident take individual or class action against the port. Port charges scale of activity and bulk Cargoes etc relocate elsewhere (e.g. Abbot Point)	Likely	Catastrophic	Extreme				not rated		See EC6. Amenity Impacts of the Port are largely in acceptable ranges.
LA10	No certainty in car park ownership and future change in land use	Loss of car park for entertainment centre \$7M	Almost Certain	Moderate	Extreme				not rated		Carpark for TEC guaranteed by this development.
LA11	Degradation of stormwater quality due to erosion, pesticides, etc.	Environmental harm	Possible	Minor	Moderate				not rated		See IN6.
LA12	Salt / PASS contamination of top layers of land	Corrosion of building materials, promote erosion, environmental harm	Likely	Minor	High				not rated		Reclamation to be strictly controlled.

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4	Part C: Additional Risks identified by TCC										Response to TCC Assessment
	Nature Conservation										
NC44	Release of PASS contaminants into CB. Runoff and Maintenance activities. Dredging.	Injury or death to marine life and destruction of their habitat	Possible	Moderate	High				not rated		See NC19.
NC47	Boat strikes on protected species	Boat strikes do result in death of marine animals, including protected species such as dugong, turtles and dolphins. Adverse publicity.	Possible	Major	Extreme				not rated		See NC34.
NC55	Increased risk of introduced pests and disease vectors due to increased capacity to accept international vessels/ and residential activities	Introduction of vermin. Potential threat to native species. Cost of eradication. Environmental costs. Public health.	Possible	Catastrophic	Extreme				not rated		See NC30.
NC56	Relocation/dispersal of pests to broader environment	Cost. Periodic closure of Port. Restrictions on domestic vessel movements.	Possible	Catastrophic	Extreme				not rated		See NC30.
	Other										
OT1	Water side accommodation and marina demand met - Opport.	Financial gain	Possible	Moderate	High				not rated		Acknowledged.
OT2	Recreational and public space provided - Opport.	Public amenity	Almost Certain	Minor	High				not rated		Acknowledged.
OT3	Fishing facilities provided - Opport.	Public amenity	Almost Certain	Minor	High				not rated		Acknowledged.
OT4	Enhance Townsville's reputation - Opport.	Tourism amenity	Possible	Moderate	High				not rated		Acknowledged.
OT5	Support Townsville as a maritime service centre - Opport.	Increased marine industry development	Possible	Moderate	High				not rated		Acknowledged.
OT6	Provide construction and long term employment - Opport.	Economic benefit	Unlikely	Minor	Low				not rated		Acknowledged especially in a tighter market.
OT7	Promotion of cruise tourism - Opport.	Economic benefit	Almost Certain	Major	Extreme				not rated		Acknowledged.
OT12	Inadequate services (such as schools, hospitals, fire, ambulance, police, etc.)	Additional cost on services	Possible	Moderate	High				not rated		See SO9.
	Social										
SO15	Insufficient parking space for public use areas	Cost of upgrade of public transport	Almost Certain	Moderate	Extreme	Adequate public carparking provided.	Rare	Minor	not rated		
SO16	Impacts to marina from an oil spill incident	Environmental harm	Possible	Minor	Moderate				not rated		See NC24.
SO19	Failure to evaluate impact on port activities.	Inappropriate evaluation allows project to proceed when maybe it shouldn't	Possible	Catastrophic	Extreme				not rated		
SO20	Breakdown of Port protection measures including codes and legal agreements	Failure of the FDA and port operations to safely coexist into the future.	Possible	Major	Extreme	PPA measures are robust.	Unlikely	Major	not rated		
SO21	Failure of residential dwellings to utilize natural cooling etc when buildings sealed up to meet PPMs	Dwelling not sustainable.	Almost Certain	Moderate	Extreme	ESD approach to development design.	Unlikely	Moderate	not rated		
SO22	Failure of Power supply	Sealed up buildings being inhabitable during extended power supply.	Possible	Minor	Moderate				not rated		Building not "sealed up"
SO23	Lack of notification re live cattle loading	Excessive smell, Loss of live cattle export to other ports	Possible	Moderate	High				not rated		See AI3.
SO24	Port fails to notify Breakwater Cove residents of certain requirements identified in EIS	Event identified occur without residents taking mitigating actions. Residents upset – Local media. Eventually effect long term viability of port	Possible	Moderate	High				not rated		PPA and Body Corporate not reliant on Port notification.
SO25	Risk of litigation, damage and harm to life and property due to port activities impacting on residents.	Legal costs	Possible	Major	Extreme				not rated		PPA avoids this.
SO26	Increased Port liability in cases of major or catastrophic event due to Residential precinct	Long term viability of port	Rare	Catastrophic	High				not rated		The environmental management of the Port is of a high standard.
SO27	6M Barrier (3 metre mound plus 3 metre fence) disintegrates during storm event	Property damage and personal injury	Rare	Moderate	Moderate	Wall design to withstand storm effects.	Rare	Minor	not rated		
SO28	6M Barrier (3 M mound plus 3 meter fence) fails to stop lights and noise etc and ameliorate port	visual impact, to multi storey buildings. Unhappy residents	Almost Certain	Moderate	Extreme				not rated		Amenity mitigation not dependent on berm and wall.
SO29	FDA Scheme-fails to get proper consideration during EIS submission process	Planning Scheme (amendment) runs with land for ever and limits opportunity to change	Likely	Major	Extreme				not rated		Provision for agreement and review.
SO30	Failure to address impacts of development on infrastructure	Infrastructure headworks charges only paid as opposed to full (trigger) costs	Possible	Catastrophic	Extreme				not rated		See IN10.
SO31	Backlash from ratepayers if forced to pay for Strand Bridge	Community outrage / Traffic congestion	Almost Certain	Major	Extreme				not rated		Refer TCC policy for Strand Bridge.
SO32	Backlash from Breakwater Cove residents if bridge is not in place when required	Community outrage / Traffic congestion	Possible	Moderate	High				not rated		Not required for Breakwater Cove.
SO33	Failure to communicate with all affected (existing) residents	Inaccurate information in EIS leads to erroneous decisions in approvals	Possible	Major	Extreme				not rated		Communication has been extensive.
SO34	That the Community review questions were not truly representative of development with complete disclosure consequences for and against proposal.	Inaccurate information in EIS leads to erroneous decisions in approvals	Possible	Major	Extreme				not rated		See SEIS - review of community consultation.
SO35	Temporary bridge forecast to be in place 3 years fails to meet service requirements of Boating community	Community outrage. Ideal waterfront community degrades to non vibrant marine community.	Likely	Moderate	High				not rated		See TT20
SO36	Loss of value to new mooring currently under construction by Motor Boat Club	Lost resale value, community outrage	Almost Certain	Moderate	Extreme				not rated		Not relevant. See SEIS report.
SO37	Impact on TOT of Shipping operations by ships using horns etc	Inconvenient noise	Almost Certain	Insignificant	High	Mitigation through the Port Protection Codes.	Almost Certain	Minor	not rated		
SO38	Insufficient consideration of separation distances/ buffers	Community complaints.	Likely	Moderate	High				not rated		No standard for separation distances. Amenity impacts are within acceptable limits.

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4	Part C: Additional Risks identified by TCC										Response to TCC Assessment
Traffic and Transport											
TT7	Opening Bridge over Ross Creek favours vehicular traffic disrupting small craft traffic and leaving an intolerable situation for small craft	Small craft traffic goes elsewhere leaving Ross Creek frontage derelict. Only traffic that can pass under bridge will pursue this haven. Wasted money on Bascule Bridge.	Almost Certain	Moderate	Extreme	Change of operating philosophy to give marine traffic priority.	Rare	Minor	not rated		
TT8	Access / egress to area during emergencies with a new strand bridge over Ross Creek - Opport.	Potential saving of life	Possible	Minor	Moderate				not rated		Acknowledged.
TT9	Strand Bridge not required for all current development. Breakwater Cove triggers requirement for Strand Bridge immediately.	Cost to the community and major road upgrades required	Almost Certain	Catastrophic	Extreme				not rated		
TT10	Excessive maintenance and operation cost	Damage to access routes and internal roads due to Storm damage (cyclone, tidal surge) shipping accident, port activities or industrial waste spills	Almost Certain	Moderate	Extreme	Design of breakwaters and roads to meet storm standards.	Unlikely	Moderate	not rated		
TT11	Traffic information supplied may be erroneous	Inaccurate information in EIS leads to erroneous decisions in approvals invites less public comment	Almost Certain	Catastrophic	Extreme				not rated		Traffic report reviewed and two additional scenarios run to check consistency of results.
TT12	Advent of Strand Bridge triggered by FDA development causes major follow on upgrade of McIlwraith Street, Dean Street (and Bridge) and the Strand, Flinders Street/Denham Street	Additional cost for upgrades to TCC and DMR	Almost Certain	Catastrophic	Extreme				not rated		Strand Bridge is not triggered by FDA but rather city growth - per TCC policy.
TT13	Access route to South Townsville cannot cope and Port Eastern Access Route is required to be opened to general traffic.	Additional cost for upgrades to TCC and DMR	Almost Certain	Catastrophic	Extreme				not rated		No data re access to South Townsville.
TT15	EIS fails to identify full small craft usage of Ross Creek	Inaccurate information in EIS leads to erroneous decisions in approvals	Almost Certain	Moderate	Extreme				not rated		SEIS upgraded the small craft survey.
TT16	Opportunity for additional shared car parking for entertainment centre (500 car parks)	\$7M	Possible	Moderate	High				not rated		Acknowledged as a benefit to the city and TEC.
TT17	Traffic on The Strand Traffic will reach congestion levels due to new Bridge diverting traffic	media outrage	Almost Certain	Moderate	Extreme				not rated		Not borne out by the revised traffic studies.
TT18	Traffic on Dean Street Traffic will reach congestion levels	Media outrage	Almost Certain	Major	Extreme				not rated		Not borne out by the revised traffic studies.
TT19	Traffic on McIlwraith Street Traffic will reach congestion levels	Media outrage	Almost Certain	Moderate	Extreme				not rated		Not borne out by the revised traffic studies.
Visual and Lighting											
VL5	Restricted airflow and decreased amenity due to acoustic wall	Increased reflective heat, loss of sea breezes in recreational areas. Reduced boardwalk amenity. Complaints	Possible	Moderate	High				not rated		To be considered in the design of the wall.
VL6	Lead Lights obscured	Marine accidents, Loss of property. Injury.	Possible	Major	Extreme				not rated		See VL7
Waste											
WA1	Illegal discharge of hazardous waste (Oils, chemicals, batteries)	Death and injury of marine animals. Environmental harm. Legal non compliance. Deterioration of water quality and ecological. Solid waste. Death of birds and marine animals/ wildlife.	Possible	Moderate	High	Management of waterways to be the responsibility of the Marina Manager acting for the Body Corporate.	Unlikely	Moderate	not rated		
WA7	Vacuum Sewerage system fails during power outage (5 days last time)	Sewage overflow; Marine environment pollution, expensive pump outs etc. Deterioration of water quality and ecological. Solid waste. Death of birds and marine animals/ wildlife.	Possible	Moderate	High	Generator hire to clear sewer in the event of power failure.	Unlikely	Moderate	not rated		
Water Resources											
WR6	Delayed maintenance dredging (and corresponding water quality implications) due to inadequate planning/approval/assessment of dredge spoil disposal process.	Environmental harm	Likely	Moderate	High	Management of water quality to be covered by EMP.	Rare	Moderate	not rated		
WR7	Inability to dispose of dredged material on a yearly basis.	Financial cost / Environmental harm	Possible	Moderate	High	Operational dredging plan in SEIS plans for a viable disposal strategy.	Rare	Moderate	not rated		

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5 Part B: Additional Risks identified by Specialists Reports											
4.3 Traffic & Transport - Marine Transport (Construction)											
TT20	There is the potential for vessels to back up into the harbour whilst temporary bridge is closed.	Disruption to marine traffic in Ross Creek	Possible	Moderate	Moderate	Restricting haul operations to outside periods of high marine traffic in Ross Creek. Increased vertical clearance of bridge by 1m to reduce potential openings. On demand bridge opening for marine traffic with a 3 minute opening and closing cycle duration. Effectively default open bridge. Contingency measures for queuing include floating pontoons to be installed for each approach.	Unlikely	Moderate	Low	Flanagans	Change of philosophy to give marine traffic priority
TT21	Proposed opening times of temporary bridge are restrictive to marine traffic.	Disruption to marine traffic in Ross Creek	Possible	Moderate	Moderate	Restricting haul operations to outside periods of high marine traffic in Ross Creek. Increased vertical clearance of bridge by 1m to reduce potential openings. On demand bridge opening for marine traffic with a 3 minute opening and closing cycle duration. Contingency measures for queuing include floating pontoons to be installed for each approach. A full time operator would be present on the bridge at all times when the bridge was down. During Wednesday twilight sailing, haulage of materials would cease at 5pm Wednesday afternoon and the bridge will default to open. Ditto Saturday from 1.00pm. Outside of all construction hours the bridge would be default open.	Unlikely	Moderate	Low	Flanagans	Restrictive opening times recognised and the operation changed.
TT22	Council considers 25m clear opening of bridge to be appropriate and expects consultation if a lesser option is envisaged.	Impacts on vessels requiring larger bridge opening width	Possible	Major	High	A clearance of 1.5m on either side an operable span of 15m would cater for all of the current vessels accessing Ross Creek upstream of the proposed bridge location. Alternate mooring/berthing arrangements could be provided downstream of the bridge alignment for vessels requiring clearance of greater than 15m.	Rare	Major	Low	Flanagans	
TT23	Access channel to the existing marina will not be available during construction	Limiting access to larger vessels	Rare	Insignificant	Negligible	The proposed temporary access route has a slightly larger minimum depth than the existing access to the marina. As such, there is no reduced level of service to/from the current marina as a result of the proposed temporary access route.	Rare	Insignificant	Negligible	Flanagans	
TT24	Limitation of manoeuvrability of marine vessels and ability to maintain a holding pattern in a narrow waterway at temporary bridge	Safety hazard and inconvenience to vessels in Ross Creek	Possible	Moderate	Moderate	Restricting haul operations to outside periods of high marine traffic in Ross Creek. Increased vertical clearance of bridge by 1m to reduce potential openings. On demand bridge opening for marine traffic with a 3 minute opening and closing cycle duration. Contingency measures for queuing include floating pontoons to be installed for each approach.	Unlikely	Moderate	Low	Flanagans	Change in philosophy to give marine traffic priority.
TT25	Failure of bridge opening mechanism	Preventing vessel passage in Ross Creek during breakdown.	Possible	Major	High	In the event of power failure or breakdown of the operating mechanism, the bridge will be designed with a counter weight to ensure that it can be opened in such circumstances.	Rare	Major	Low	Flanagans	
TT26	Existing channel into the Breakwater Marina will not be available during construction	Cumulative loss of utilisation of craft except in high part of tide.	Rare	Insignificant	Negligible	The proposed temporary access route has a slightly higher minimum depth than the existing access to the marina. As such, there is no reduced level of service to/from the current marina as a result of the proposed temporary access route.	Rare	Insignificant	Negligible	Flanagans	
4.3 Traffic & Transport - Marine Transport (Operation)											
TT26	The required 100m clearance from a military ship berthed at cruise ship terminal will obstruct access to and from Cleveland Bay by boat users who presently use Ross Creek.	Disruption of vessels in Ross Creek	Possible	Major	High	Sufficient flexibility for continued access.	Rare	Major	Low	Flanagans	US Navy confirms flexibility approach.
TT27	A low level of forward thrust may be imposed on a cruise ship berthed at the TOT from a ship leaving the Port from Berth 9 or 10.	Damage to ships berthed at the TOT terminal	Possible	Catastrophic	Extreme	Management plan to be finalised with the Regional Harbour Master.	Rare	Catastrophic	Moderate	Flanagans	Not a significant issue following discussion with the Acting Harbour Master.
TT28	Navigational modelling study would be required for vessels larger than 238m.	TOT berth not of adequate length for future shipping	Possible	Moderate	Moderate	The Port of Townsville would need to be licenced to accept larger vessels before the full proposed length of the cruise ship terminal berth could be utilised. This would entail a navigation study to obtain approval for an increase in maximum length. The TOT berth is long enough for ships in excess of 300m.	Unlikely	Moderate	Low	Flanagans	

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5	Part B: Additional Risks identified by Specialists Reports									From Specialist Report	
TT29	The development results in increased demand for public boat launch facilities.	Insufficient availability of boat launch facilities	Unlikely	Minor	Negligible	Breakwater Cove residents have access to private berthing facilities and marina. Any increase in boat launching in Ross Creek emanating from the new residences in Breakwater Cove is likely to be very limited.	Unlikely	Minor	Negligible	Flanagans	
4.8 Air (Operation)											
A16	Exposure of site residents to elevated lead levels	Human health impacts.	Unlikely	Major		Lead measurements within health limits.	Unlikely	Major	High	ANE	Port performance and record in controlling emissions is recognised.
A17	Exposure of residents to Q fever from livestock transport within the Port	Human health impacts.	Rare	Major	Moderate	No mitigation measures proposed as those considered most at risk are animal husbandry workers not ship loaders.	Rare	Major	Moderate	ANE	
4.9 Visual Amenity & Lighting (Construction)											
VL7	Over-lighting of night-time construction activities.	Impacts on navigation	Possible	Major	High	Mitigation of impacts through lighting design, or if necessary shrouding of construction lighting.	Rare	Major	Low	Flanagans	
4.9 Visual Amenity & Lighting (Operation)											
VL8	Over-lighting within operational TOT and Breakwater Cove site	Confusion or obscuring of lead lights thereby hampering navigation.	Rare	Catastrophic	Extreme	The Acting Harbour Master advised that there is not likely to be a significant impact on navigational markers and beacons arising from the development of the proposed cruise ship terminal and associated residential development.	Rare	Catastrophic	Moderate	Flanagans	
VL9	High level of lighting on a cruise ship at berth.	Adverse impact on the luminescence of lead lights in the Platypus Channel	Unlikely	Catastrophic	Extreme	Shrouding of lead lights to reduce the impact of the cruise ship lighting on the luminescence of the lead light.	Rare	Catastrophic	Moderate	Flanagans	
4.11 Nature (Operation)											
NC56	Loss of internal portion of northern breakwater	Loss of roosting and foraging habitat for birds.	Likely	Moderate	High	Creation of compensatory habitat on extended northern breakwater in consultation with bird specialists, use of rip-rap for breakwater construction, staged construction to reduce impacts, no dogs on construction site, fencing of bird habitat during construction, environmental officer to monitor birds during construction, monitoring of bird habitats during operation.	Unlikely	Moderate	Low	Natural Solutions	
NC57	Loss of internal and external Port Western breakwater	Loss of roosting and foraging habitat for birds.	Likely	Moderate	High	Creation of compensatory habitat on extended northern breakwater in consultation with bird specialists, use of rip-rap for breakwater construction, staged construction to reduce impacts, no dogs on construction site, fencing of bird habitat during construction, environmental officer to monitor birds during construction, monitoring of bird habitats during operation.	Unlikely	Moderate	Low	Natural Solutions	
NC58	Pedestrian access to northern breakwater	Loss of foraging opportunities and energy expenditure for birds.	Likely	Moderate	High	Creation of compensatory habitat on extended northern breakwater in consultation with bird specialists, use of rip-rap for breakwater construction, staged construction to reduce impacts, no dogs on construction site, fencing of bird habitat during construction, environmental officer to monitor birds during construction, monitoring of bird habitats during operation.	Unlikely	Moderate	Low	Natural Solutions	
NC59	Reclamation of shallow open water	Loss of shallow feeding resources for birds.	Likely	Moderate	High	Creation of compensatory habitat on extended northern breakwater in consultation with bird specialists, use of rip-rap for breakwater construction, staged construction to reduce impacts, no dogs on construction site, fencing of bird habitat during construction, environmental officer to monitor birds during construction, monitoring of bird habitats during operation.	Unlikely	Moderate	Low	Natural Solutions	

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5	Part B: Additional Risks identified by Specialists Reports									From Specialist Report	
4.15 Economy (Operation)											
EC18	Location of residents in the Breakwater Cove development exposes them to unacceptable noise, odour and air pollutant emissions from the Port of Townsville.	Exposure to these Port emissions will give rise to increased residential complaints about the Port and user operations.	Possible	Moderate	Moderate	Port emissions are well within acceptable limits with a few infrequent exceptions. Mitigation measures can be effective in achieving compliance with environmental standards. Socio-economic analysis predicts an extremely small increase in complaint activity as a result of population growth close to the Port.	Unlikely	Moderate	Low	Transpac	
EC19	Complaints from Breakwater Cove residents in the short term	In the short term complaints results in increased costs to the Port of Townsville in handling complaints.	Possible	Major	High	Socio-economic analysis has shown that the likelihood of a significant increase in complaints is extremely low under current and future Port emission conditions and present community expectations.	Unlikely	Major	Moderate	Transpac	
EC20	Complaints from Breakwater Cove residents in the short term	In the long term, complaints cause increased environmental compliance requirements for the Port of Townsville.	Possible	Catastrophic	Extreme	Socio-economic analysis has demonstrated that if the Port and its users continue to comply with existing regulatory and license conditions and obligations, the risks of increased legislative, regulatory and policy burdens are extremely low under current and future conditions.	Unlikely	Catastrophic	High	Transpac	
EC21	Properties within Breakwater Cove are vulnerable to natural hazards and climate change	Higher insurance premiums across the board.	Unlikely	Minor	Negligible	Investigation revealed that at-risk properties bear the insurance cost of increased risk to natural hazards and climate change. Lower risk properties and insurers do not bear the cost of the increased risk.	Unlikely	Minor	Negligible	Transpac	
EC22	Impacts of the proposed development on fisheries values	Economic loss of fisheries	Possible	Moderate	Moderate	No mitigation measures proposed loss is temporary. Long term impacts are likely to be positive.	Possible	Moderate	Moderate	Transpac	
EC23	Impacts of the proposed development on operations of the Port of Townsville	Additional capital expenditure at the Port sooner than is currently planned	Possible	Moderate	Moderate	The operation of the Port meets the strict environmental standards of the Port. Amenity impacts are virtually all benign therefore impacts requiring early or additional expenditure improbable.	Possible	Moderate	Moderate	Transpac	