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<tbody>
<tr>
<td>CL1</td>
<td>Climate</td>
<td>Strong winds caused by tropical cyclones or low pressure systems</td>
<td>Possible</td>
<td>Major</td>
<td>High</td>
<td>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.</td>
<td>Possible</td>
<td>Major</td>
<td>High</td>
<td>16</td>
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<tr>
<td>CL2</td>
<td>Climate</td>
<td>Flooding caused by storm surge</td>
<td>Possible</td>
<td>Major</td>
<td>High</td>
<td>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.</td>
<td>Possible</td>
<td>Minor</td>
<td>Low</td>
<td>16</td>
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<tr>
<td>CL3</td>
<td>Climate</td>
<td>Flooding caused by heavy rainfall</td>
<td>Possible</td>
<td>Major</td>
<td>High</td>
<td>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.</td>
<td>Possible</td>
<td>Minor</td>
<td>Low</td>
<td>16</td>
<td>x</td>
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<tr>
<td>CL6</td>
<td>Climate</td>
<td>Extended wet weather during construction</td>
<td>Possible</td>
<td>Major</td>
<td>High</td>
<td>Site secured and site personnel and equipment relocated to safe refuge. Site remediation works post event.</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>5,15</td>
<td></td>
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<tr>
<td>LA1</td>
<td>Land</td>
<td>Degradation of water quality due to erosion</td>
<td>Degradation of water quality</td>
<td>Possible</td>
<td>Minor</td>
<td>Low</td>
<td>Site fully bunded and contained. Sedimentation and erosion control measures in place under EMP.</td>
<td>Possible</td>
<td>Minor</td>
<td>Low</td>
<td>6</td>
<td></td>
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<tr>
<td>LA2</td>
<td>Land</td>
<td>Unstable slopes and structures due to soil instability</td>
<td>Degradation of water quality</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Geotechnical Analysis for design of slopes and barriers. Specific design parameters for retaining and re-vegetation works.</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>6</td>
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<tr>
<td>LA3</td>
<td>Land</td>
<td>Degradation of water quality due to existing contaminants in sediment</td>
<td>Degradation of water quality</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Site fully bunded and contained. Sedimentation and turbidity control measures in place under EMP.</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>5</td>
<td></td>
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<tr>
<td>LA4</td>
<td>Land</td>
<td>Acidification of water due to acid sulphate soils</td>
<td>Degradation of water quality</td>
<td>Rare</td>
<td>Moderate</td>
<td>Negligible</td>
<td>Site fully bunded and contained. Sedimentation, turbidity control and treatment measures in place under EMP.</td>
<td>Rare</td>
<td>Moderate</td>
<td>Negligible</td>
<td>5,10</td>
<td></td>
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<tr>
<td>LA5</td>
<td>Land</td>
<td>Collapse of new revetment walls during construction</td>
<td>Damage to equipment, risk to personnel, construction delays</td>
<td>Unlikely</td>
<td>Moderate</td>
<td>Low</td>
<td>Level 1 construction supervision - appropriate design based on investigation and analysis</td>
<td>Rare</td>
<td>Major</td>
<td>Low</td>
<td>x</td>
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<tr>
<td>LA6</td>
<td>Land</td>
<td>Failure of depressurization system through sand layers while excavating canals</td>
<td>Sudden instability with destruction damage to infrastructure and equipment and risk to personnel</td>
<td>Rare</td>
<td>Moderate</td>
<td>Negligible</td>
<td>Monitoring of depressurization system through construction as identified in EMP.</td>
<td>Rare</td>
<td>Moderate</td>
<td>Negligible</td>
<td>x</td>
<td></td>
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<tr>
<td>LA7</td>
<td>Land</td>
<td>Potential high seepage rates through existing southern revetment wall</td>
<td>Additional pumping requirements</td>
<td>Unlikely</td>
<td>Moderate</td>
<td>Low</td>
<td>Additional depressurization walls along southern revetment wall</td>
<td>Unlikely</td>
<td>Moderate</td>
<td>Low</td>
<td>x</td>
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<tr>
<td>LA8</td>
<td>Land</td>
<td>Slow consolidation of stockpiled organic soft clay in parkland area</td>
<td>Short-term consolidation of reclaimed parklands</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Monitoring of settlement rates additional surcharge/wick drains, minor remediation grading works.</td>
<td>Possible</td>
<td>Minor</td>
<td>Low</td>
<td>x</td>
<td></td>
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<tr>
<td>LA9</td>
<td>Land</td>
<td>Difficulty in compaction of fill</td>
<td>Construction staging method delays / site reworkability issues, increased resultant settlements / instability</td>
<td>Rare</td>
<td>Moderate</td>
<td>Negligible</td>
<td>Level 1 construction supervision - appropriate placement compactation methods.</td>
<td>Rare</td>
<td>Moderate</td>
<td>Negligible</td>
<td>x</td>
<td></td>
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<tr>
<td>LA10</td>
<td>Land</td>
<td>Shallow sand beds not identified during site investigation</td>
<td>Higher seepage rates, instability</td>
<td>Rare</td>
<td>Moderate</td>
<td>Negligible</td>
<td>Monitoring during construction stage. Construction of additional extraction wells as required</td>
<td>Rare</td>
<td>Moderate</td>
<td>Negligible</td>
<td>5</td>
<td></td>
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<tr>
<td>LA11</td>
<td>Land</td>
<td>Poor installation of HDPE/Bentonite liner in breakwaters and bunds</td>
<td>Increased seepage rates/erosion of breakwaters and bunds</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Close construction stage control of HDPE/Bentonite placement. Additional dewatering wells.</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>x</td>
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<tr>
<td>LA12</td>
<td>Land</td>
<td>Puncture of HDPE/Bentonite liner</td>
<td>Increased seepage rates/erosion of breakwaters and bunds</td>
<td>Likely</td>
<td>Minor</td>
<td>Moderate</td>
<td>Close construction stage control of HDPE/Bentonite placement over sand bedding. Additional dewatering wells.</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>x</td>
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<tr>
<td>LA13</td>
<td>Land</td>
<td>Under estimated modelling assumptions for seepage</td>
<td>Higher pumping requirements</td>
<td>Unlikely</td>
<td>Moderate</td>
<td>Low</td>
<td>Monitoring during construction stage. Construction of additional extraction wells as required</td>
<td>Unlikely</td>
<td>Moderate</td>
<td>Low</td>
<td>5</td>
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<tr>
<td>LA14</td>
<td>Land</td>
<td>Inability to move/fandle/organic soft clay material</td>
<td>Construction staging method delays</td>
<td>Possible</td>
<td>Moderate</td>
<td>High</td>
<td>Undertake trials of equipment and handling techniques proposed by contractor</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Low</td>
<td>x</td>
<td></td>
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<tr>
<td>LA15</td>
<td>Land</td>
<td>Imported select fit not suitable to purpose</td>
<td>Construction staging method delays, material performance issues</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Level 1 supervision of imported fit. Additional investigation and testing of source material for suitability</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
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<tr>
<td>LA16</td>
<td>Land</td>
<td>Large rock fill for access construction road fails to penetrate fully through organic soft clay</td>
<td>Localized and potentially abrupt settlements of surface</td>
<td>Possible</td>
<td>Major</td>
<td>High</td>
<td>Level 1 supervision of construction methodology</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
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<tr>
<td>LA18</td>
<td>Land</td>
<td>Abutment instability of temporary Ross Creek bridge</td>
<td>Temporary closure of haul route and material access to site</td>
<td>Possible</td>
<td>Major</td>
<td>High</td>
<td>Geotechnical investigation and analysis of abutments and appropriate design</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
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<tr>
<td>LA19</td>
<td>Land</td>
<td>Poor water quality in basin upon rewatering of site</td>
<td>Turbidity issues</td>
<td>Likely</td>
<td>Moderate</td>
<td>High</td>
<td>Controlled, low velocity rewatering of site, monitor turbidity, open areas progressively cell by cell</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
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<tr>
<td>LA20</td>
<td>Land</td>
<td>Inexperienced earthworks contractor</td>
<td>Time delays</td>
<td>Unlikely</td>
<td>Major</td>
<td>Moderate</td>
<td>Selection of experienced contractor with experienced personnel on site</td>
<td>Unlikely</td>
<td>Moderate</td>
<td>Low</td>
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<td>Reference</td>
<td>Risk</td>
<td>Potential consequences</td>
<td>Likelihood</td>
<td>Consequence</td>
<td>Risk Rating</td>
<td>Proposed risk treatment</td>
<td>Likelihood</td>
<td>Consequence</td>
<td>Risk Rating</td>
<td>EMP Element(s)</td>
<td>SWMP</td>
<td>RIMP</td>
<td>DMI Design in Merchandising imapct</td>
<td>Construction Phase Action plans</td>
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<td>4.3</td>
<td>Traffic and Transport</td>
<td>Accidental spill from material transfer</td>
<td>Rare</td>
<td>Insignificant</td>
<td>Negligible</td>
<td>Material spill and erosion control measures in place under EMP</td>
<td>Rare</td>
<td>Moderate</td>
<td>Negligible</td>
<td>14,6</td>
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<td></td>
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<td>Traffic incidents with existing Road Users</td>
<td>Unlikely</td>
<td>Moderate</td>
<td>Major</td>
<td>Haul routes and Site Traffic Management Plan</td>
<td>Unlikely</td>
<td>Major</td>
<td>Moderate</td>
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<td></td>
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<td>Noise associated with haul routes</td>
<td>Likely</td>
<td>Moderate</td>
<td>High</td>
<td>Haul routes and Site Traffic Management Plan</td>
<td>Likely</td>
<td>Moderate</td>
<td>High</td>
<td>4,1</td>
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<td></td>
<td></td>
<td>Degradation of traffic and transport infrastructure</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Remediation of repair to damaged infrastructure</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
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<td></td>
<td>Increased site traffic impeding public access</td>
<td>Possible</td>
<td>Minor</td>
<td>Low</td>
<td>Short term impact: selection of haul routes to minimise impacts</td>
<td>Possible</td>
<td>Minor</td>
<td>Low</td>
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<td>4.4</td>
<td>Non-transport infrastructure</td>
<td>Elevation energy unable to provide sufficient</td>
<td>Power supply insufficient, infrastructure upgrade required</td>
<td>Rare</td>
<td>Insignificant</td>
<td>Negligible</td>
<td>Design loadings calculated and liaison with authorities to provide sufficient lead times for upgrades</td>
<td>Unlikely</td>
<td>Moderate</td>
<td>Low</td>
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<tr>
<td></td>
<td></td>
<td>Existing civil infrastructure unable to provide sufficient</td>
<td>Infrastructure upgrade required</td>
<td>Rare</td>
<td>Insignificant</td>
<td>Negligible</td>
<td>Design loadings calculated and liaison with authorities to provide sufficient lead times for upgrades</td>
<td>Rare</td>
<td>Moderate</td>
<td>Negligible</td>
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<td></td>
<td></td>
<td>Reduction in water quality caused by stormwater</td>
<td>Degradation of water quality</td>
<td>Unlikely</td>
<td>Moderate</td>
<td>Low</td>
<td>Stormwater management in accordance with project EMP</td>
<td>Unlikely</td>
<td>Moderate</td>
<td>Low</td>
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<tr>
<td>4.5</td>
<td>Waste</td>
<td>Excessive material and services resources use during construction</td>
<td>Depletion of natural resources</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Waste reduction and recycling in accordance with the Waste hierarchy in the EPP Waste</td>
<td>Possible</td>
<td>Minor</td>
<td>Low</td>
<td>13</td>
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<td></td>
<td></td>
<td>Emission of liquid wastes to waterways due to poor practices in waste containment, waste transport and stormwater control</td>
<td>Deterioration of water quality and ecological values in aquatic ecosystems</td>
<td>Possible</td>
<td>Major</td>
<td>High</td>
<td>Stormwater management in accordance with project EMP, hazardous materials management in accordance with project EMP, waste minimisation and management in accordance with the project EMP</td>
<td>Unlikely</td>
<td>Minor</td>
<td>Negligible</td>
<td>6,14, 13</td>
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<td></td>
<td></td>
<td>Emission of solid wastes to land due to poor practices in waste containment, waste transport and stormwater control</td>
<td>Recreational and amenity impacts</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Waste minimisation and management practices for storage and disposal of solid waste in accordance with the project SWMP and EMP</td>
<td>Unlikely</td>
<td>Minor</td>
<td>Negligible</td>
<td>13,6</td>
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<td></td>
<td></td>
<td>Emission of dust and particulates to air due to poor construction practices</td>
<td>Human health and amenity impacts</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Air quality control measures during construction in accordance with the project EMP</td>
<td>Possible</td>
<td>Minor</td>
<td>Low</td>
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<tr>
<td>4.6</td>
<td>Water Resources</td>
<td>Release of turbid waters during site dewatering</td>
<td>Impacts on seagrasses and ecological communities in Cleveland Bay</td>
<td>Likely</td>
<td>Moderate</td>
<td>High</td>
<td>Control of dewatering under the EMP; three indicative discharge areas are highlighted adjacent to each of the breakwaters. Preferred locations in rank order are discharge to Ross Creek, discharge adjacent to northern breakwater, discharge adjacent Strand breakwater</td>
<td>Unlikely</td>
<td>Minor</td>
<td>Negligible</td>
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<tr>
<td>4.7</td>
<td>Coastal Resources</td>
<td>Extreme Storm Tide Event - 100 year ARI</td>
<td>Destruction/damage to equipment and infrastructure</td>
<td>Possible</td>
<td>Minor</td>
<td>Low</td>
<td></td>
<td>Possible</td>
<td>Minor</td>
<td>Low</td>
<td>16, 15</td>
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<tr>
<td></td>
<td></td>
<td>Extreme Storm Tide Event - greater than 100 year ARI</td>
<td>Destruction/damage to equipment and infrastructure</td>
<td>Rare</td>
<td>Catastrophic</td>
<td>Moderate</td>
<td>The 100 year ARI is the &quot;Designated Storm Tide Event&quot; (as defined by EPA). Site secured and site personnel and equipment relocated to safe refuge. Site remediation works post event.</td>
<td>Rare</td>
<td>Major</td>
<td>Low</td>
<td>16, 15</td>
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<tr>
<td></td>
<td></td>
<td>Extreme Waves - to 100 year ARI</td>
<td>Destruction/damage to equipment and infrastructure</td>
<td>Possible</td>
<td>Minor</td>
<td>Low</td>
<td>Marine infrastructure structurally designed to accommodate 100 year ARI cyclone waves with minimal damage. Site secured and site personnel and equipment relocated to safe refuge. Site remediation works post event.</td>
<td>Possible</td>
<td>Minor</td>
<td>Low</td>
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<tr>
<td></td>
<td></td>
<td>Extreme Waves - greater than 100 year ARI</td>
<td>Destruction/damage to equipment and infrastructure</td>
<td>Rare</td>
<td>Catastrophic</td>
<td>Moderate</td>
<td>Marine infrastructure structurally designed to accommodate 100 year ARI cyclone waves with minimal damage. Site secured and site personnel and equipment relocated to safe refuge. Site remediation works post event.</td>
<td>Rare</td>
<td>Major</td>
<td>Low</td>
<td>16, 15</td>
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<tr>
<td></td>
<td></td>
<td>Breakwater failure</td>
<td>Destruction/damage to equipment and infrastructure</td>
<td>Rare</td>
<td>Major</td>
<td>Low</td>
<td>Marine infrastructure structurally designed to accommodate 100 year ARI cyclone waves with minimal damage. Site secured and site personnel and equipment relocated to safe refuge. Site remediation works post event.</td>
<td>Rare</td>
<td>Major</td>
<td>Low</td>
<td></td>
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<tr>
<td>4.8</td>
<td>Air</td>
<td>Emission of dust and particulate matter from construction activities</td>
<td>Amenity impacts on existing residents in the vicinity of the project site</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Air quality control measures in accordance with the project EMP</td>
<td>Possible</td>
<td>Minor</td>
<td>Low</td>
<td>2</td>
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</table>

Appendix A - Construction Risk Register 14-11-07 Page 2 of 6 Construction Risks
### Risk Register - EIS: Construction Risks

**Project name:** Townsville Ocean Terminal  
**Project number:** Q900704  
**Date created:** 16 Mar 07  
**Revised by:** Matt Smith  
**Date revised:** 14 Nov 07

#### 4.9 Visual Amenity and Lighting

**NV6 Construction noise impact on existing residential and retail areas**  
Annoyance, resident complaints  
Potential consequences: Possible, Moderate  
Risk Rating: Moderate  
Proposed risk treatment: Establish complaint hotline, preparation of construction noise and vibration management plan, execution of noise and vibration management and minimisation  
Likelihood: Moderate  
Consequence: Possible  
Risk Rating: Minor  
Residual Risk: Low  

#### 4.10 Noise and Vibration

**NV7 Increase in road traffic noise at residences along public roads during construction**  
Annoyance, resident complaints. Council/DMR may refuse permission to use proposed haulage routes due to unreasonable noise levels.  
Possible, Moderate  
Possible, Moderate  
Possible, Moderate  
Possible, Moderate  
Possible, Moderate  
Possible, Moderate  
Possible, Moderate  
Possible, Moderate  
Possible, Moderate  
Possible, Moderate  
Likelihood: Low  
Consequence: Low  
Risk Rating: Low  
Residual Risk: Low  

**NV8 Noise from construction impacts on marine life**  
Physical and behavioural impacts on marinelife in vicinity of project site.  
Possible, Major  
Possible, Major  
Possible, Major  
Possible, Major  
Possible, Major  
Possible, Major  
Possible, Major  
Possible, Major  
Possible, Major  
Possible, Major  
Possible, Major  
Likelihood: Moderate  
Consequence: Moderate  
Risk Rating: Moderate  
Residual Risk: Moderate  

**NV9 Vibration impact from construction equipment on existing residences**  
Human discomfort, complaints to Council  
Unlikely, Moderate, Low  
Unlikely, Minor, Negligible  
Unlikely, Minor, Negligible  
Unlikely, Minor, Negligible  
Unlikely, Minor, Negligible  
Likelihood: Likely  
Consequence: Likely  
Risk Rating: Likely  
Residual Risk: Likely  

**NV10 Vibration impact from construction equipment on Casino and Entertainment Centre**  
Structural damage to nearby buildings  
Unlikely, Moderate, Low  
Unlikely, Minor, Negligible  
Unlikely, Minor, Negligible  
Unlikely, Minor, Negligible  
Unlikely, Minor, Negligible  
Likelihood: Likely  
Consequence: Likely  
Risk Rating: Likely  
Residual Risk: Likely  

**NV11 Vibration impact from construction equipment on Casino and Entertainment Centre**  
Human discomfort, complaints to Council  
Possible, Moderate, Moderate  
Possible, Moderate, Moderate  
Possible, Moderate, Moderate  
Possible, Moderate, Moderate  
Possible, Moderate, Moderate  
Likelihood: Moderate  
Consequence: Moderate  
Risk Rating: Moderate  
Residual Risk: Moderate  

**NV12 Vibration impact from construction equipment on Casino and Entertainment Centre**  
Structural damage to nearby buildings  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Likelihood: High  
Consequence: High  
Risk Rating: High  
Residual Risk: High  

#### 4.11 Nature Conservation

**NC1 Sediment destabilisation through changes in sediment transport regime (e.g. dredging in adjacent areas)**  
Seagrass impacts  
Likely, Major, Extreme  
Likely, Minor, Moderate  
Likelihood: Likely  
Consequence: Likely  
Risk Rating: Likely  
Residual Risk: Likely  

**NC2 Light attenuation through, for example, increased turbidity associated with dredging activities**  
Seagrass impacts  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Likelihood: Likely  
Consequence: Likely  
Risk Rating: Likely  
Residual Risk: Likely  

**NC3 Nutrient enrichment leading to increased macroalgal growth (e.g. effluent discharge)**  
Seagrass impacts  
Unlikely, Major, Moderate  
Unlikely, Major, Moderate  
Unlikely, Major, Moderate  
Unlikely, Major, Moderate  
Unlikely, Major, Moderate  
Likelihood: Unlikely  
Consequence: Unlikely  
Risk Rating: Unlikely  
Residual Risk: Unlikely  

**NC4 Contamination from spill (oil, chemicals)**  
Seagrass impacts  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Likelihood: Likely  
Consequence: Likely  
Risk Rating: Likely  
Residual Risk: Likely  

**NC5 Contamination from disturbed contaminated sediments**  
Seagrass impacts  
Unlikely, Moderate, Low  
Unlikely, Moderate, Low  
Unlikely, Moderate, Low  
Unlikely, Moderate, Low  
Unlikely, Moderate, Low  
Likelihood: Unlikely  
Consequence: Unlikely  
Risk Rating: Unlikely  
Residual Risk: Unlikely  

**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.  
Likelihood: Unlikely  
Consequence: Unlikely  
Risk Rating: Unlikely  
Residual Risk: Unlikely  

**NC7 Smothering through garbage and debris accumulation**  
Seagrass impacts  
Likely, Major, Moderate  
Waste control measures contained in project EMP. Waste controlled via fully bunded site.  
Likelihood: Unlikely  
Consequence: Unlikely  
Risk Rating: Unlikely  
Residual Risk: Unlikely  

**NC8 Light attenuation through turbidity**  
Coral reef impacts  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Likelihood: Likely  
Consequence: Likely  
Risk Rating: Likely  
Residual Risk: Likely  

**NC10 Sediment deposition**  
Coral reef impacts  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Likelihood: Likely  
Consequence: Likely  
Risk Rating: Likely  
Residual Risk: Likely  

**NC11 Nutrient enrichment leading to increased macroalgal growth**  
Coral reef impacts  
Unlikely, Major, Moderate  
Unlikely, Major, Moderate  
Unlikely, Major, Moderate  
Unlikely, Major, Moderate  
Unlikely, Major, Moderate  
Likelihood: Unlikely  
Consequence: Unlikely  
Risk Rating: Unlikely  
Residual Risk: Unlikely  

**NC12 Contamination and mortality from spill (oil, chemicals)**  
Coral reef impacts  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Possible, Major, High  
Likelihood: Likely  
Consequence: Likely  
Risk Rating: Likely  
Residual Risk: Likely  

**NC13 Contamination from disturbed contaminated sediments**  
Coral reef impacts  
Unlikely, Major, Moderate  
Unlikely, Major, Moderate  
Unlikely, Major, Moderate  
Unlikely, Major, Moderate  
Unlikely, Major, Moderate  
Likelihood: Unlikely  
Consequence: Unlikely  
Risk Rating: Unlikely  
Residual Risk: Unlikely  

**NC14 Smothering through garbage and debris accumulation**  
Coral reef impacts  
Unlikely, Moderate, Low  
Waste control measures contained in project EMP. Waste controlled via fully bunded site.  
Likelihood: Unlikely  
Consequence: Unlikely  
Risk Rating: Unlikely  
Residual Risk: Unlikely  

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Appendix A - Construction Risk Register 14-11-07  
Page 3 of 6  
Construction Risks
| Reference | Risk | Potential consequences | Likelihood | Consequence | Proposed risk treatment | Original risk | Residual Risk | Management
<table>
<thead>
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<tbody>
<tr>
<td>NC16</td>
<td>Sediment deposition / burial</td>
<td>Benthic community impacts</td>
<td>Possible</td>
<td>Minor</td>
<td>Use of silt curtains during dredging and dredge protocols contained in project EMP. Controlled dewatering of fully bunded site.</td>
<td>unlikely</td>
<td>Minor</td>
<td>Negligible</td>
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<tr>
<td>NC17</td>
<td>Nutrient enrichment leading to increased macroalgal growth</td>
<td>Benthic community impacts</td>
<td>unlikely</td>
<td>Minor</td>
<td>Negligible</td>
<td>unlikely</td>
<td>Minor</td>
<td>Negligible</td>
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<tr>
<td>NC18</td>
<td>Contamination and mortality from spill (oil, chemicals)</td>
<td>Benthic community impacts</td>
<td>possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>unlikely</td>
<td>Minor</td>
<td>Negligible</td>
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<tr>
<td>NC19</td>
<td>Contamination from disturbed contaminated sediments</td>
<td>Benthic community impacts</td>
<td>unlikely</td>
<td>Moderate</td>
<td>Low</td>
<td>unlikely</td>
<td>Minor</td>
<td>Negligible</td>
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<tr>
<td>NC20</td>
<td>Smothering through garbage and debris accumulation</td>
<td>Benthic community impacts</td>
<td>unlikely</td>
<td>Moderate</td>
<td>Low</td>
<td>unlikely</td>
<td>Minor</td>
<td>Negligible</td>
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<tr>
<td>NC21</td>
<td>Effects of reduction in water quality</td>
<td>Fish and fisheries impacts</td>
<td>possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>unlikely</td>
<td>Moderate</td>
<td>Low</td>
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<tr>
<td>NC22</td>
<td>Impacts on food resources (e.g. benthic communities)</td>
<td>Fish and fisheries impacts</td>
<td>possible</td>
<td>Major</td>
<td>High</td>
<td>unlikely</td>
<td>Moderate</td>
<td>Low</td>
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<tr>
<td>NC23</td>
<td>Contamination and mortality from spill (oil, chemicals)</td>
<td>Fish and fisheries impacts</td>
<td>possible</td>
<td>Major</td>
<td>High</td>
<td>unlikely</td>
<td>Minor</td>
<td>Negligible</td>
</tr>
<tr>
<td>NC24</td>
<td>Noise pollution (impact on organisms relying on seagrass beds)</td>
<td>Fish and fisheries impacts</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>High</td>
<td>Visual survey of site to detect noise sensitive species prior to commencement of construction works. Dispersal of noise sensitive species using motorised vessels.</td>
<td>Possible</td>
<td>Minor</td>
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<tr>
<td>NC25</td>
<td>Disturbance to breeding and nursery habitats</td>
<td>Fish and fisheries impacts</td>
<td>Likely</td>
<td>Moderate</td>
<td>High</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
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<tr>
<td>NC26</td>
<td>Smothering of habitat through garbage and debris accumulation</td>
<td>Fish and fisheries impacts</td>
<td>unlikely</td>
<td>Moderate</td>
<td>Low</td>
<td>unlikely</td>
<td>Moderate</td>
<td>Low</td>
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<tr>
<td>NC27</td>
<td>Hazard to fisheries through accumulated garbage</td>
<td>Fish and fisheries impacts</td>
<td>unlikely</td>
<td>Moderate</td>
<td>Low</td>
<td>unlikely</td>
<td>Moderate</td>
<td>Low</td>
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<tr>
<td>NC28</td>
<td>Effects of reduction in water quality</td>
<td>Impacts on flowing green bay</td>
<td>unlikely</td>
<td>Moderate</td>
<td>Low</td>
<td>unlikely</td>
<td>Moderate</td>
<td>Low</td>
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<tr>
<td>NC29</td>
<td>Contamination and mortality from spill (oil, chemicals)</td>
<td>Impacts on flowing green bay</td>
<td>unlikely</td>
<td>Major</td>
<td>Moderate</td>
<td>unlikely</td>
<td>Minor</td>
<td>Negligible</td>
</tr>
<tr>
<td>NC30</td>
<td>Noise pollution</td>
<td>Impacts on marine mammals and reptiles</td>
<td>Almost Certain</td>
<td>Major</td>
<td>Extreme</td>
<td>Visual survey of site to detect noise sensitive species prior to commencement of construction works. Dispersal of noise sensitive species using motorised vessels.</td>
<td>Possible</td>
<td>Moderate</td>
</tr>
<tr>
<td>NC31</td>
<td>Harmful marine debris</td>
<td>Impacts on marine mammals and reptiles</td>
<td>Likely</td>
<td>Major</td>
<td>Extreme</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>NC32</td>
<td>Impacts on food resources (e.g. seagrass beds)</td>
<td>Impacts on marine mammals and reptiles</td>
<td>possible</td>
<td>Major</td>
<td>High</td>
<td>unlikely</td>
<td>Minor</td>
<td>Negligible</td>
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<tr>
<td>NC33</td>
<td>Contamination and mortality from spill (oil, chemicals)</td>
<td>Impacts on marine mammals and reptiles</td>
<td>possible</td>
<td>Major</td>
<td>High</td>
<td>unlikely</td>
<td>Minor</td>
<td>Negligible</td>
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<tr>
<td>NC34</td>
<td>Contamination / reduction in breeding and nursery habitats</td>
<td>Impacts on marine mammals and reptiles</td>
<td>possible</td>
<td>Major</td>
<td>High</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
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<tr>
<td>NC35</td>
<td>Effects of reduction in water quality</td>
<td>Impacts on marine mammals and reptiles</td>
<td>possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>unlikely</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>NC36</td>
<td>Harmful marine debris</td>
<td>Protected bird species</td>
<td>Likely</td>
<td>Major</td>
<td>Extreme</td>
<td>Possible</td>
<td>Moderate</td>
<td>Moderate</td>
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<tr>
<td>NC37</td>
<td>Contamination / reduction of breeding areas</td>
<td>Protected bird species</td>
<td>possible</td>
<td>Major</td>
<td>High</td>
<td>Possible</td>
<td>Moderate</td>
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<tr>
<td>NC38</td>
<td>Impact on food resources</td>
<td>Protected bird species</td>
<td>possible</td>
<td>Moderate</td>
<td>Moderate</td>
<td>unlikely</td>
<td>Moderate</td>
<td>Low</td>
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### Risk Register - EIS: Construction Risks

<table>
<thead>
<tr>
<th>Risk</th>
<th>Potential consequences</th>
<th>Original risk</th>
<th>Residual Risk</th>
<th>Construction Phase Action plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH1</td>
<td>Negative impacts on Aboriginal cultural values</td>
<td>Diminished cultural significance of Cleveland Bay and local waterways.</td>
<td>Unlikely Moderate Low</td>
<td>Cultural monitoring and site inspection program to be implemented during development of the site. Training of construction contractors and staff.</td>
</tr>
<tr>
<td>CH2</td>
<td>Disturbance of sites that may remain in sub-tidal deposits</td>
<td>Negative impact on archaeological record.</td>
<td>Unlikely Moderate Low</td>
<td>Implementation of a protocol in the event of a find of cultural significance and appropriate management actions in consultation with the Traditional Owners.</td>
</tr>
<tr>
<td>CH3</td>
<td>Negative impacts on local environmental values</td>
<td>Diminished Aboriginal use of the area for cultural practices such as fishing and foraging</td>
<td>Unlikely Moderate Low</td>
<td>Review of expert environmental reports by Traditional Owners.</td>
</tr>
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#### 4.13 Social

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<tbody>
<tr>
<td>SD1</td>
<td>Air quality impacts during construction</td>
<td>Adverse impacts on amenity and livability</td>
<td>Possible Major High</td>
<td>Air quality control measures in accordance with the project EMP</td>
<td>Possible Minor Low</td>
<td>2</td>
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<tr>
<td>SD1a</td>
<td>Noise impacts during construction</td>
<td>Adverse impacts on amenity and livability</td>
<td>Possible Major High</td>
<td>Establish complaint hotline, preparation of construction noise and vibration management plan, execution of noise and vibration management and minimisation measures.</td>
<td>Possible Minor Low</td>
<td>1</td>
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<tr>
<td>SD5</td>
<td>Increased marine traffic</td>
<td>Impacts on existing recreational uses</td>
<td>Rare Insignificant Negligible</td>
<td>Planned regular movements provided to TPA and harbour master.</td>
<td>Rare Minor Negligible x</td>
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<tr>
<td>SC4</td>
<td>Increased vehicular traffic</td>
<td>Impacts on existing and future residents</td>
<td>Possible Moderate Moderate</td>
<td>Provide density plans as part of EIS submission to enable government authorities to plan for service upgrades with maximum lead times</td>
<td>Possible Moderate Moderate</td>
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<tr>
<td>SD5</td>
<td>Reduced public amenity during construction</td>
<td>Construction related activities will generate some amenity impacts on the Strand thereby reducing amenity for users</td>
<td>Likely Minor Moderate Low</td>
<td>Short-term impact. Selection of haul routes to minimise impacts.</td>
<td>Likely Minor Moderate</td>
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<tr>
<td>SD6</td>
<td>Reduced public access to recreational space and facilities during construction</td>
<td>Inability of previous users to access old breakwater (e.g. recreational anglers)</td>
<td>Almost Certain Low</td>
<td>Safety considerations must come to the fore during the construction phase to safeguard the public access to the breakwater which would be inappropriate.</td>
<td>Almost Certain Insignificant Moderate</td>
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<tr>
<td>SD13</td>
<td>Environmental degradation</td>
<td>Degradation of the marine environment in particular during construction</td>
<td>Unlikely Major Moderate High</td>
<td>Adhesion to environmental plans contained in project EMP. Controlled impacts via fully bunded site.</td>
<td>Unlikely Moderate Low</td>
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<tr>
<td>SD15</td>
<td>Increased dust, noise and congestion along haulage routes</td>
<td>Residential and road user disamenities resulting from sustained periods of quarry materials haulage</td>
<td>Possible Moderate Moderate Low</td>
<td>Short-term impact. Selection of haul routes to minimise impacts.</td>
<td>Possible Minor Low</td>
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#### 4.14 Health and Safety

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<tbody>
<tr>
<td>HS3</td>
<td>Construction traffic</td>
<td>Increased traffic on haul roads and noise</td>
<td>Likely Moderate High</td>
<td>Establish complaint hotline, select haul routes with minimum number of properties affected, maintain and operate equipment efficiently</td>
<td>Possible Moderate Moderate</td>
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<tr>
<td>HS4</td>
<td>Public health and safety</td>
<td>Impacts on public H&amp;S during construction</td>
<td>Unlikely Major Moderate</td>
<td>Adequate signage and fencing to secure the site and prevent unauthorised access.</td>
<td>Unlikely Major Moderate</td>
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<tr>
<td>HS5</td>
<td>Construction health and safety</td>
<td>Health and safety impacts on construction workforce</td>
<td>Unlikely Major Moderate</td>
<td>Construction contractor to implement WH&amp;S measures.</td>
<td>Unlikely Major Moderate</td>
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#### 4.15 Economy

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<tbody>
<tr>
<td>EC1</td>
<td>Potential impact on existing labour markets</td>
<td>Inability of existing workforce to provide adequate skills and labour</td>
<td>Unlikely Moderate Low</td>
<td>Encouragement of suitable labour force into local market.</td>
<td>Unlikely Moderate Low</td>
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<tr>
<td>EC2</td>
<td>Potential impacts on existing housing and accommodation stock (during construction)</td>
<td>Inability of existing accommodation to cope with increased demand</td>
<td>Possible Moderate Moderate</td>
<td>Expended labour force will be drawn from existing local workforce.</td>
<td>Possible Minor Low</td>
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<tr>
<td>EC5</td>
<td>Potential impact on future regional development</td>
<td>Inability of future projects to source sufficient volumes of quarry materials from local sources (resulting in increased costs and project delays)</td>
<td>Rare Moderate Negligible</td>
<td>Rosewell Quarry has been specifically re-opened to supply materials for this project. Significant reserves still exist in the vicinity to provide material for future developments.</td>
<td>Rare Moderate Negligible</td>
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<tr>
<td>EC7</td>
<td>Potential impact on existing marine users during construction</td>
<td>Impairment of operations of existing Ross Creek users</td>
<td>Rare Minor Negligible</td>
<td>Future production schedules are consistent with existing user requirements.</td>
<td>Rare Minor Negligible x</td>
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#### 4.17 Other

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<tbody>
<tr>
<td>CM1</td>
<td>Sand Littoral 3D Failure</td>
<td>Destruction of Property</td>
<td>Possible Moderate Moderate</td>
<td>Geotechnical Analysis for design of slopes and embankments. Specific design parameters for retaining and revetment works. Level 1 construction supervision.</td>
<td>Possible Moderate Moderate x</td>
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<tr>
<td>CM2</td>
<td>Percolation and Dewatering</td>
<td>Work Site Flooding</td>
<td>Likely Moderate High</td>
<td>Monitoring of depressurisation system through construction as identified in EMP. Reduced Working Cells.</td>
<td>Possible Moderate Moderate 5 x</td>
<td></td>
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<tr>
<td>CM3</td>
<td>Dewatering Equipment Failure</td>
<td>Work Site Flooding</td>
<td>Rare Moderate Negligible</td>
<td>Level 1 construction supervision. Reduced Working Cells.</td>
<td>Rare Moderate Negligible 5 x</td>
<td></td>
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</tr>
<tr>
<td>CM4</td>
<td>HDPE / Bentonite Membrane Failure</td>
<td>Work Site Flooding</td>
<td>Likely Moderate High</td>
<td>Monitoring of depressurisation system through construction as identified in EMP. Reduced Working Cells.</td>
<td>Possible Moderate Moderate x</td>
<td></td>
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</tbody>
</table>
## Risk Register - EIS: Construction Risks

**Project name:** Townsville Ocean Terminal  
**Project number:** QL00704  
**Date created:** 16 Mar 07  
**Date revised:** 14 Nov 07

### Reference | Risk | Potential consequences | Likelihood | Consequence | Risk Rating | Proposed risk treatment | Residual Risk | Construction Phase Action plans |
--- | --- | --- | --- | --- | --- | --- | --- | --- |
CM5 | Work Site Flooding | Work Site Flooding | Possible | Moderate | Moderate | Monitoring of depressurization system through construction as identified in EMP. Reduced Working Cells. | Possible | Moderate | Moderate |
CM6 | Spoil Disposal unsuitable as fill material | Movement of Materials Off Site and Treatment | Almost Certain | Minor | High | Agreement with Port Authority to receive materials to enable relocation and treatment. | Almost Certain | Minor | High |
CM7 | Parklands Settlement | Destruction of Property (landscape element) | Almost Certain | Minor | High | Site remediation works post event. | Almost Certain | Insignificant | Moderate |
CM8 | Green Topped Breakwaters | Destruction of Property | Possible | Moderate | Moderate | Marine infrastructure structurally designed to accommodate 100 year ARI cyclone waves with minimal damage. Site secured and site personnel and equipment relocated to safe refuge. Site remediation works post event. | Possible | Moderate | Moderate |
CM9 | Green Topped Seawall | Destruction of Property (landscape element) | Possible | Minor | Low | Marine infrastructure structurally designed to accommodate 100 year ARI cyclone waves with minimal damage. Site secured and site personnel and equipment relocated to safe refuge. Site remediation works post event. | Possible | Minor | Low |
CM10 | Sheet Pile Failure | Destruction of Property | Unlikely | Moderate | Low | Site fully bunded post sheet pile installation. Site remediation works post event. | Unlikely | Moderate | Low |
CM11 | Loss of Construction Equipment | Loss of Construction Equipment | Rare | Insignificant | Negligible | Construction contractor to implement WH&S measures. Site remediation works post event. | Rare | Insignificant | Negligible |
CM12 | Construction Equipment Failure | Loss of Construction Equipment | Unlikely | Insignificant | Negligible | Site remediation works post event. | Unlikely | Insignificant | Negligible |
CM13 | Construction WH&S Risks | Injury or Loss of Life | Possible | Major | High | Construction contractor to implement WH&S measures. | Possible | Major | High |

| Risk | Likelihood | Consequence | Risk Rating | EMP Element(s) | SBMP | RUP | Detailed Design | Construction Phase Action plans |
--- | --- | --- | --- | --- | --- | --- | --- | --- |
CM5 | Moderate | Moderate | Moderate | 5 | x |  |
CM6 | High | Insignificant | Moderate | 17 | x |  |
CM7 | Moderate | Moderate | Moderate | 5 | x | x |
CM8 | Moderate | Moderate | Moderate | 5 | x | x |
CM9 | Low | Negligible | Moderate | x | x |  |
CM10 | Low | Negligible | Low | x | x |  |
CM11 | Negligible | Negligible | Negligible | x | x |  |
CM12 | Negligible | Negligible | Negligible | x |  |
CM13 | High | Major | High | 16 | x |  |

### Likelihood Scale
- Extreme: 5
- High: 35
- Moderate: 40
- Low: 23
- Negligible: 14

### Consequence Scale
- Extreme: 0
- High: 4
- Moderate: 34
- Low: 47
- Negligible: 32

### Risk Rating Scale
- Extreme: 5
- High: 35
- Moderate: 40
- Low: 23
- Negligible: 14

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Appendix A - Construction Risk Register 14-11-07  
Page 6 of 6  
Construction Risks