

**Port of Gladstone
Gatcombe and Golding Cutting
Channel Duplication Project**

Environmental Impact Statement



Gladstone Ports Corporation
Growth, Prosperity, Community

aurecon

**Appendix I4
Ecology potential
impacts and risk
assessment ratings**

Appendix I4

Ecology potential impacts and risk assessment ratings

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1 Terrestrial and intertidal flora and wetlands

1.1 Establishment of the dredged material placement area and BUF

1.1.1 Permanent loss of values within the Western Basin Expansion reclamation area and BUF

1.1.1.1 Wetlands

Table 1.1 Summary of consequence and risk ratings for permanent loss of wetland values during establishment of the Western Basin Expansion reclamation area and BUF

Wetland values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Port Curtis DIWA and Queensland Wetlands mapping estuarine wetlands	High (high x moderate)	Almost certain	Very High	N/A
Queensland HES Wetland	High (high x moderate)	Almost certain	Very High	N/A

1.1.2 Permanent or irreversible fragmentation or loss of connectivity values

1.1.2.1 Wetlands

Table 1.2 Summary of consequence and risk ratings for permanent or irreversible fragmentation, or loss of connectivity values during establishment of the Western Basin Expansion reclamation area and BUF

Wetland values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Port Curtis DIWA and Queensland Wetlands mapping estuarine wetlands	High (high x moderate)	Unlikely	Medium	N/A
Queensland HES Wetland	High (high x moderate)	Unlikely	Medium	N/A

1.1.3 Introduction and spread of weed and/or pest species and increased edge effects

1.1.3.1 Flora values

Table 1.3 Summary of consequence and risk ratings for introduction and spread of weed and/or pest species and increased edge effects during establishment of the Western Basin Expansion reclamation area and BUF

Terrestrial and intertidal flora values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal saltmarsh TEC	Moderate (high x low)	Unlikely	Low	No
Mangrove communities	Low (moderate x low)	Unlikely	Low	No
Terrestrial vegetation to the west of the WBE reclamation area	Low (moderate x low)	Unlikely	Low	No
Potential habitat for terrestrial flora species of conservation significance to the west of the WBE reclamation area	High (Very high x low)	Unlikely	Medium	No
Terrestrial vegetation adjoining the proposed haul routes to be used for transporting reclamation area and BUF bund wall material (excluding for flora species of conservation significance)	Low (low x low)	Unlikely	Low	No

1.1.3.2 Wetlands

Table 1.4 Summary of consequence and risk ratings for the introduction and spread of weed and/or pest species and increased edge effects during establishment of the Western Basin Expansion reclamation area and BUF

Wetland values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Port Curtis DIWA and Queensland Wetlands mapping estuarine wetlands	Moderate (high x low)	Unlikely	Low	N/A
Queensland HES Wetland	Moderate (high x low)	Unlikely	Low	N/A

1.1.4 Potential hydrodynamic impacts and short term decline in water quality

1.1.4.1 Flora values

Table 1.5 Summary of consequence and risk ratings for potential hydrodynamic and water quality impacts within terrestrial and intertidal vegetation communities during establishment of the Western Basin Expansion reclamation area and BUF

Terrestrial and intertidal flora values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal saltmarsh TEC	Moderate (high x low)	Unlikely	Low	No
Mangrove communities	Low (moderate x low)	Unlikely	Low	No

1.1.4.2 Wetlands

Table 1.6 Summary of consequence and risk ratings for hydrodynamic and water quality impacts on wetlands during establishment of the Western Basin Expansion reclamation area and BUF

Wetland values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Port Curtis DIWA and Queensland Wetlands mapping estuarine wetlands	Moderate (high x low)	Unlikely	Low	N/A
Queensland HES Wetland	Moderate (high x low)	Unlikely	Low	N/A

1.1.5 Increase in dust due to increased truck movements and construction works

1.1.5.1 Flora values

Table 1.7 Summary of consequence and risk ratings for increase in dust generation during establishment of the Western Basin Expansion reclamation area and BUF

Terrestrial and intertidal flora values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal saltmarsh TEC	Moderate (high x low)	Unlikely	Low	No
Mangrove communities	Low (moderate x low)	Unlikely	Low	No
Terrestrial vegetation to the west of the WBE reclamation area	Low (moderate x low)	Unlikely	Low	No

Terrestrial and intertidal flora values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Potential habitat for terrestrial flora species of conservation significance to the west of the WBE reclamation area	High (very high x low)	Unlikely	Medium	No
Terrestrial vegetation adjoining the proposed haul routes to be used for transporting reclamation area and BUF bund wall material (excluding for flora species of conservation significance)	Low (low x low)	Unlikely	Low	No

1.1.5.2 Wetlands

Table 1.8 Summary of consequence and risk ratings for dust and noise impacts on wetlands and associated fauna habitat during establishment of the Western Basin Expansion reclamation area and BUF

Wetland values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Port Curtis DIWA and Queensland Wetlands mapping estuarine wetlands	Moderate (high x low)	Unlikely	Low	N/A
Queensland HES Wetland	Moderate (high x low)	Unlikely	Low	N/A

1.1.6 Short term decline in water quality in the marine environment

1.1.6.1 Flora values

Table 1.9 Summary of consequence and risk ratings for short term declines in water quality in the marine environment and impacts on terrestrial and intertidal flora during establishment of the Western Basin Expansion reclamation area and BUF

Terrestrial and intertidal flora values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal saltmarsh TEC	High (high x moderate)	Unlikely	Medium	No
Mangrove communities	Moderate (moderate x moderate)	Unlikely	Low	No
Terrestrial vegetation to the west of the WBE reclamation area	Moderate (moderate x moderate)	Rare	Low	No
Potential habitat for terrestrial flora species of conservation significance to the west of the WBE reclamation area	Very high (very high x moderate)	Rare	Medium	No

1.1.6.2 Wetlands

Table 1.10 Summary of consequence and risk ratings for short term declines in water quality in the marine and impacts on wetlands during establishment of the Western Basin Expansion reclamation area and BUF

Wetland values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Port Curtis DIWA and Queensland Wetlands mapping estuarine wetlands	High (high x moderate)	Unlikely	Medium	N/A
Queensland HES Wetland	High (high x moderate)	Unlikely	Medium	N/A

1.2 Dredging activities

1.2.1 Permanent loss of values from the areas to be dredged

1.2.1.1 Wetlands

Table 1.11 Summary of consequence and risk ratings for the permanent loss of wetland values from the areas to be dredged

Ecological value	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Port Curtis DIWA	Very high (high x high)	Unlikely	High	N/A
Queensland Wetlands mapping estuarine wetlands	Very high (high x high)	Unlikely	High	N/A

1.2.2 Potential water quality impacts

1.2.2.1 Wetlands

Table 1.12 Summary of consequence and risk ratings for water quality impacts on wetland values from the areas to be dredged

Ecological value	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Port Curtis DIWA and Queensland Wetlands mapping estuarine wetlands	High (high x moderate)	Possible	Medium	N/A
Queensland HES Wetland	Moderate (high x low)	Possible	Medium	N/A

1.2.3 Introduction and spread of weed and/or pest species into areas adjoining the Western Basin Expansion reclamation area

1.2.3.1 Flora values

Table 1.13 Summary of consequence and risk ratings for the introduction and spread of weed and/or pest species on flora values due to dredging activities

Ecological value	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal saltmarsh TEC	Moderate (high x low)	Unlikely	Low	N/A
Mangrove communities	Low (moderate x low)	Unlikely	Low	N/A
Terrestrial vegetation to the west of the WBE reclamation area	Low (moderate x low)	Rare	Negligible	N/A
Potential habitat for terrestrial flora species of conservation significance to the west of the WBE reclamation area	Low (very high x low)	Rare	Low	N/A

1.2.3.2 Wetlands

Table 1.14 Summary of consequence and risk ratings for the introduction and spread of weed and/or pest species on wetland values due to dredging activities

Ecological value	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Port Curtis DIWA and Queensland Wetlands mapping estuarine wetlands	Moderate (high x low)	Unlikely	Low	N/A
Queensland HES Wetland	Moderate (high x low)	Unlikely	Low	N/A

1.2.4 Release of contaminants from the dredging vessels into areas adjoining the Western Basin Expansion reclamation area

1.2.4.1 Flora values

Table 1.15 Summary of consequence and risk ratings for the potential release of contaminants on flora values from the dredging vessels

Ecological value	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal saltmarsh TEC	Moderate (high x low)	Unlikely	Low	N/A
Mangrove communities	Low (moderate x low)	Unlikely	Low	N/A

Ecological value	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Terrestrial vegetation to the west of the WBE reclamation area	Low (moderate x low)	Rare	Negligible	N/A
Potential habitat for terrestrial flora species of conservation significance to the west of the WBE reclamation area	High (very high x low)	Rare	Medium	N/A

1.2.4.2 Wetlands

Table 1.16 Summary of consequence and risk ratings for contamination and general waste impacts to wetlands during dredging activities

Ecological value	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Port Curtis DIWA and Queensland Wetlands mapping estuarine wetlands	High (high x moderate)	Unlikely	Medium	N/A
Queensland HES Wetland	High (high x moderate)	Unlikely	Medium	N/A

1.3 Removal and installation of navigational aids

1.3.1 Permanent loss of values from removal and installation of navigational aids

1.3.1.1 Wetlands

Table 1.17 Summary of consequence and risk ratings for permanent loss of areas of benthic communities during removal and installation of navigational aids

Wetland values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Port Curtis DIWA and Queensland Wetlands mapping estuarine wetlands	Moderate (high x low)	Unlikely	Low	N/A

1.3.2 Release of contaminants from the pile driving barge

1.3.2.1 Wetlands

Table 1.18 Summary of consequence and risk ratings for release of contaminants from the pile driving barge to wetlands during removal and installation of navigational aids

Wetland values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Port Curtis DIWA	Moderate (high x low)	Unlikely	Low	N/A
Queensland HES Wetland	Moderate (high x low)	Unlikely	Low	N/A

1.4 Stabilisation and maintenance activities

1.4.1 Introduction and spread of weed and/or pest species

1.4.1.1 Flora values

Table 1.19 Summary of consequence and risk ratings for the introduction and spread of weed and/or pest species into terrestrial and intertidal flora communities due to maintenance works

Terrestrial and intertidal flora community and location	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal saltmarsh TEC	High (high x moderate)	Unlikely	Medium	No
Mangrove communities	Moderate (moderate x moderate)	Unlikely	Low	No
Terrestrial vegetation to the west of the WBE reclamation area	Moderate (moderate x moderate)	Unlikely	Low	No
Potential habitat for terrestrial flora species of conservation significance to the west of the WBE reclamation area	Very high (very high x moderate)	Rare	Medium	No

1.4.1.2 Wetlands

Table 1.20 Summary of consequence and risk ratings associated with the introduction and spread of weed and/or pest species into wetland areas due to maintenance works

Wetland values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Port Curtis DIWA	Moderate (high x low)	Unlikely	Low	N/A
Queensland HES Wetland	Moderate (high x low)	Unlikely	Low	N/A

1.4.2 Short term decline in water quality

1.4.2.1 Flora values

Table 1.21 Summary of consequence and risk ratings for short term decline in water quality during surface stabilisation and maintenance works into intertidal flora communities

Terrestrial and intertidal flora community and location	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal saltmarsh TEC	Moderate (high x low)	Unlikely	Low	No
Mangrove communities	Low (moderate x low)	Unlikely	Low	No

1.4.2.2 Wetlands

Table 1.22 Summary of consequence and risk ratings for the short term decline in water quality during surface stabilisation and maintenance works into wetland areas

Wetland values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Port Curtis DIWA and Queensland Wetland mapping estuarine wetlands	Moderate (high x low)	Unlikely	Low	N/A
Queensland HES Wetland	Moderate (high x low)	Unlikely	Low	N/A

1.4.3 Increase in dust during surface stabilisation and maintenance activities

1.4.3.1 Flora values

Table 1.23 Summary of consequence and risk ratings associated with an increase in dust during surface stabilisation and maintenance works in terrestrial and intertidal communities

Terrestrial and intertidal community and location	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal saltmarsh TEC	Moderate (high x low)	Unlikely	Low	No
Mangrove communities	Low (moderate x low)	Unlikely	Low	No

1.4.3.2 Wetlands

Table 1.24 Summary of consequence and risk ratings associated with deposition of dust in wetlands due to stabilisation activities

Wetland values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Port Curtis DIWA and Queensland Wetland mapping estuarine wetlands	Moderate (high x low)	Unlikely	Low	N/A
Queensland HES Wetland	Moderate (high x low)	Unlikely	Low	N/A

1.5 Operation of the duplicated shipping channels

- No impacts expected, or risk of potential impacts is negligible

1.6 Maintenance dredging

Table 1.25 Summary of consequence and risk ratings associated with maintenance dredging on wetland values

Wetland values	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Port Curtis DIWA and Queensland Wetland mapping estuarine wetlands	High (high x moderate)	Unlikely	Medium	N/A
Queensland HES Wetland	Moderate (high x low)	Unlikely	Low	N/A

2 Intertidal and terrestrial fauna

2.1 Establishment of the dredged material placement area

2.1.1 Permanent loss of habitat area and connectivity

Table 2.1 Summary of consequence and risk ratings for permanent loss of intertidal and terrestrial fauna habitat associated with the establishment of the Western Basin Expansion reclamation area and BUF

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Vulnerable or Migratory fauna species under the EPBC Act or Vulnerable or Near threatened fauna species under the NC Act	High (high x moderate)	Likely	High	Yes (refer Appendix I3)
Fauna species not listed as having conservation significance under the EPBC Act and/or the NC Act	Low (low x moderate)	Likely	Medium	No

2.1.2 Direct mortality and injury of fauna

Table 2.2 Summary of consequence and risk ratings for potential direct mortality or injury of fauna species associated with the establishment of the Western Basin Expansion reclamation area and BUF

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Vulnerable or Migratory fauna species under the EPBC Act or Vulnerable or Near threatened fauna species under the NC Act	Moderate (high x low)	Unlikely	Low	No
Fauna species not listed as having conservation significance under the EPBC Act and/or the NC Act	Low (low x low)	Unlikely	Low	No

2.1.3 Potential indirect impacts

2.1.3.1 Displacement of fauna due to noise, vibration, dust and artificial lighting

Table 2.3 Summary of consequence and risk ratings for potential displacement of fauna due to increases in noise, vibration and/or dust associated with the establishment of the Western Basin Expansion reclamation area and BUF

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Vulnerable or Migratory fauna species under the EPBC Act or Vulnerable or Near threatened fauna species under the NC Act	Moderate (high x low)	Possible	Medium	No
Fauna species not listed as having conservation significance under the EPBC Act and/or the NC Act	Low (low x low)	Possible	Low	No

2.1.3.2 Contaminant and sediment releases into adjacent habitat

Table 2.4 Summary of consequence and risk ratings for potential impacts to fauna assemblages and habitat due to contaminant and sediment releases associated with the establishment of the Western Basin Expansion reclamation area and BUF

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Vulnerable or Migratory fauna species under the EPBC Act or Vulnerable or Near threatened fauna species under the NC Act	Moderate (high x low)	Unlikely	Low	No
Fauna species not listed as having conservation significance under the EPBC Act and/or the NC Act	Low (low x low)	Unlikely	Low	No

2.1.3.3 Potential impact of hydrological changes on fauna habitat

Table 2.5 Summary of consequence and risk ratings for potential impacts to fauna habitat due to hydrological changes associated with the establishment of the Western Basin Expansion reclamation area and BUF

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Vulnerable or Migratory fauna species under the EPBC Act or Vulnerable or Near threatened fauna species under the NC Act	High (high x moderate)	Unlikely	Medium	No
Fauna species not listed as having conservation significance under the EPBC Act and/or the NC Act	Low (low x moderate)	Unlikely	Low	No

2.1.3.4 Introduction and spread of weed and pest species

Table 2.6 Summary of consequence and risk ratings for potential displacement of fauna due to the introduction and spread of weed and/or pest species associated with the establishment of the Western Basin Expansion reclamation area and BUF

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Vulnerable or Migratory fauna species under the EPBC Act or Vulnerable or Near threatened fauna species under the NC Act	High (high x moderate)	Unlikely	Medium	No
Fauna species not listed as having conservation significance under the EPBC Act and/or the NC Act	Low (low x moderate)	Unlikely	Low	No

2.2 Dredging activities

2.2.1 Potential direct mortality and injury of fauna

Table 2.7 Summary of consequence and risk ratings for the potential direct mortality or injury of fauna associated with the dredging activities and placement of material within the Western Basin and Western Basin Expansion reclamation areas

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Vulnerable or Migratory fauna species under the EPBC Act or Vulnerable or Near threatened fauna species under the NC Act	High (high x moderate)	Unlikely	Medium	No
Fauna species not listed as having conservation significance under the EPBC Act and/or the NC Act	Low (low x moderate)	Unlikely	Low	No

2.2.2 Potential indirect impacts

2.2.2.1 Altered groundwater quality

Table 2.8 Summary of consequence and risk ratings for the potential impact on fauna habitat due to altered groundwater levels associated with dredged material placement at the Western Basin and Western Basin Expansion reclamation areas

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Vulnerable or Migratory fauna species under the EPBC Act or Vulnerable or Near threatened fauna species under the NC Act	Moderate (high x low)	Unlikely	Medium	No
Fauna species not listed as having conservation significance under the EPBC Act and/or the NC Act	Low (low x low)	Unlikely	Low	No

2.2.2.2 Potential displacement of fauna due to increases in noise, vibration, dust and artificial lighting

Table 2.9 Summary of consequence and risk ratings for the potential displacement of fauna due to increases in noise, vibration and dust associated with dredging activities and dredged material placement at the Western Basin and Western Basin Expansion reclamation areas

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Vulnerable or Migratory fauna species under the EPBC Act or Vulnerable or Near threatened fauna species under the NC Act	Moderate (high x moderate)	Unlikely	Low	No
Fauna species not listed as having conservation significance under the EPBC Act and/or the NC Act	Low (low x moderate)	Unlikely	Low	No

2.2.2.3 Potential impact on fauna species and habitats due to contaminant releases

Table 2.10 Summary of consequence and risk ratings for the potential impact on fauna species and their habitat due to contaminant releases associated with dredging activities

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Vulnerable or Migratory fauna species under the EPBC Act or Vulnerable or Near threatened fauna species under the NC Act	High (high x moderate)	Unlikely	Medium	No
Fauna species not listed as having conservation significance under the EPBC Act and/or the NC Act	Low (low x moderate)	Unlikely	Low	No

2.2.2.4 Potential water quality impacts due to bund wall failure or seepage

Table 2.11 Summary of consequence and risk ratings for the potential water quality impacts due to bund wall failure or seepage associated with dredged material placement at Western Basin and Western Basin Expansion reclamation areas

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Vulnerable or Migratory fauna species under the EPBC Act or Vulnerable or Near threatened fauna species under the NC Act	High (high x moderate)	Unlikely	Medium	No
Fauna species not listed as having conservation significance under the EPBC Act and/or the NC Act	Low (low x moderate)	Unlikely	Low	No

2.3 Removal and installation of navigational aids

2.3.1 Contaminant and sediment releases into adjacent habitat

Table 2.12 Summary of consequence and risk ratings for the potential impact on fauna species and their habitat due to contaminant releases associated with the removal and installation of navigational aids

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Vulnerable or Migratory fauna species under the EPBC Act or Vulnerable or Near threatened fauna species under the NC Act	Moderate (high x low)	Unlikely	Low	No
Fauna species not listed as having conservation significance under the EPBC Act and/or the NC Act	Low (low x low)	Unlikely	Low	No

2.4 Stabilisation and maintenance activities

Table 2.13 Summary of consequence and risk ratings for impacts on intertidal and terrestrial species associated with stabilisation and establishment of the final Western Basin and Western Basin Expansion reclamation area landforms

Conservation significance of species and/or habitat	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Vulnerable or Migratory fauna species under the EPBC Act or Vulnerable or Near threatened fauna species under the NC Act	Moderate (high x low)	Unlikely	Low	No
Fauna species not listed as having conservation significance under the EPBC Act and/or the NC Act	Low (low x low)	Unlikely	Low	No

2.5 Operation of the duplicated shipping channels

- No impacts expected, or risk of potential impacts is negligible

2.6 Maintenance dredging

- No impacts expected, or risk of potential impacts is negligible

3 Seagrass meadows and epibenthic macroalgae

3.1 Establishment of the dredged material placement area and BUF

3.1.1 Permanent loss and alteration of habitat

Table 3.1 Summary of consequence and risk ratings for seagrass meadows for establishment of the Western Basin Expansion reclamation area and BUF

Seagrass meadow type (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal seagrass meadows (Protected (Fisheries Act))	Very high (very high x moderate)	Almost certain	Very high	N/A

3.1.2 Secondary impacts of permanent loss of seagrass meadows

Table 3.2 Summary of consequence and risk ratings for seagrass meadows for secondary impacts associated with establishment of the Western Basin Expansion reclamation area and BUF

Seagrass meadow type (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal seagrass meadows (Protected (Fisheries Act))	Very high (very high x high)	Unlikely	High	N/A

3.1.3 Short term decline in water quality in the marine environment

Table 3.3 Summary of consequence and risk ratings for seagrass meadows for short term decline in water quality during establishment of the Western Basin Expansion reclamation area and BUF

Seagrass meadow type (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal seagrass meadows (Protected (Fisheries Act))	Very high (very high x moderate)	Unlikely	High	N/A

3.1.4 Hydrodynamic impacts on adjacent seagrass meadows

Table 3.4 Summary of consequence and risk ratings for seagrass meadows as a result of hydrodynamic impacts associated with the establishment of the Western Basin Expansion reclamation area and BUF

Seagrass meadow type (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal seagrass meadows (Protected (Fisheries Act))	Very high (very high x moderate)	Possible	High	N/A

3.2 Dredging activities

3.2.1 Permanent loss and alteration of habitat

Table 3.5 Summary of consequence and risk ratings for seagrass meadows and macroalgae for a permanent loss or alteration of benthic substrate at the areas to be dredged

Seagrass meadow type (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Deep water seagrass meadows (Protected (Fisheries Act))	High (high x moderate)	Unlikely	Medium	N/A
Benthic macroalgae	Moderate (moderate x moderate)	Possible	Medium	N/A

3.2.2 Short term decline in water quality in the marine environment

3.2.2.1 Impact of turbidity on benthic light availability

Table 3.6 Summary of consequence and risk ratings for impacts to benthic light on seagrass meadows and macroalgae during dredging activities

Seagrass meadow type (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal seagrass meadows (Protected (Fisheries Act))	High (very high x moderate)	Unlikely	Medium	N/A
Deep water seagrass meadows (Protected (Fisheries Act))	High (high x moderate)	Unlikely	Medium	N/A
Benthic macroalgae	Moderate (moderate x moderate)	Unlikely	Low	N/A

3.2.3 Short term increase in sediment deposition in the marine environment

3.2.3.1 Impact of turbidity on sediment deposition

Table 3.7 Summary of consequence and risk ratings for impacts to sediment deposition on seagrass meadows and macroalgae during dredging activities

Seagrass meadow type (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal seagrass meadows (Protected (Fisheries Act))	High (very high x moderate)	Possible	High	N/A
Deep water seagrass meadows (Protected (Fisheries Act))	High (high x moderate)	Unlikely	Medium	N/A
Benthic macroalgae	Moderate (moderate x moderate)	Unlikely	Low	N/A

3.3 Removal and installation of navigational aids

- No impacts expected, or risk of potential impacts is negligible

3.4 Stabilisation and maintenance activities

3.4.1 Short term decline water quality in the marine environment

Table 3.8 Summary of consequence and risk ratings for seagrass meadows for a short term decline in water quality during stabilisation and maintenance activities

Seagrass meadow type (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal seagrass meadows (Protected (Fisheries Act))	High (very high x low)	Unlikely	Medium	N/A

3.5 Operation of the duplicated shipping channels

- No impacts expected, or risk of potential impacts is negligible

3.6 Maintenance dredging

Table 3.9 Summary of consequence and risk ratings for seagrass meadows and macroalgae for maintenance dredging

Seagrass meadow type (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coastal seagrass meadows (Protected (Fisheries Act))	Very high (very high x moderate)	Unlikely	High	N/A

Seagrass meadow type (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Deep water seagrass meadows (Protected (Fisheries Act))	High (high x moderate)	Unlikely	Medium	N/A
Benthic macroalgae	Moderate (moderate x moderate)	Unlikely	Low	N/A

4 Reef communities

4.1 Establishment of the dredged material placement area and BUF

4.1.1 Short term decline in water quality in the marine environment

Table 4.1 Summary of consequence and risk ratings for reef habitat for short term decline in water quality during establishment of the Western Basin Expansion reclamation area and BUF

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coral reefs, fringing reefs and inshore turbid reefs (OUV of GBRWHA)	Moderate (high x low)	Unlikely	Low	N/A
Other reef habitat	Low (moderate x low)	Unlikely	Low	N/A

4.2 Dredging activities

4.2.1 Permanent loss and alteration of reef habitat

Table 4.2 Summary of consequence and risk ratings for reef habitat for a permanent and irreversible loss of benthic substrate at the areas to be dredged during dredging activities

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Other reef habitat	Moderate (moderate x moderate)	Likely	Medium	N/A

4.2.2 Short term decline in water quality in the marine environment

4.2.2.1 Impact of sedimentation on reef habitat

Table 4.3 Summary of consequence and risk ratings for reef habitat for short term decline in water quality during dredging activities

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Coral reefs, fringing reefs and inshore turbid reefs (OUV of GBRWHA)	Moderate (high x low)	Unlikely	Low	N/A
Other reef habitat	Moderate (moderate x low)	Unlikely	Low	N/A

4.3 Removal and installation of navigational aids

- No impacts expected, or risk of potential impacts is negligible

4.4 Stabilisation and maintenance activities

- No impacts expected, or risk of potential impacts is negligible

4.5 Operation of the duplicated shipping channels

- No impacts expected, or risk of potential impacts is negligible

4.6 Maintenance dredging

Table 4.4 Summary of consequence and risk ratings for reef communities for maintenance dredging

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Other reef habitat	Low (moderate x low)	Possible	Low	N/A

5 Fish and other marine reptiles

5.1 Establishment of the dredged material placement area and BUF

5.1.1 Permanent loss and alteration of habitat

Table 5.1 Summary of consequences and risk ratings for potential impacts associated with the establishment of the Western Basin Expansion reclamation area and BUF on fish species and values

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Species of conservation significance and/or migratory fauna species listed under the EPBC Act and/or the NC Act	High (high x moderate)	Unlikely	Medium	Yes (refer to Appendix I3)
Sea kraits and other marine reptiles	Low (low x moderate)	Unlikely	Low	No
Estuarine and coastal fish communities	Moderate (moderate x moderate)	Unlikely	Low	No
Commercial fisheries	High (high x moderate)	Unlikely	Medium	No
Recreational fisheries	Moderate (moderate x moderate)	Unlikely	Low	No

5.1.2 Potential noise and vibration impacts

Table 5.2 Summary of consequence and risk ratings for potential direct mortality or injury of fish and other marine reptile species due to increases in noise and vibration associated with the establishment of the Western Basin Expansion reclamation area and BUF

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Species of conservation significance and/or migratory species				
Species of conservation significance and/or migratory fauna species listed under the EPBC Act and/or the NC Act	Moderate (high x low)	Possible	Medium	No
Other marine reptiles				
Species not listed as having conservation significance under the EPBC Act and/or the NC Act (including Sea snakes and kraits)	Low (low x low)	Possible	Low	No
Estuarine and coastal fish communities				
Estuarine and coastal fish communities	Low (moderate x low)	Possible	Low	No

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Fisheries				
Commercial fisheries	Moderate (high x low)	Possible	Medium	No
Recreational fisheries	Low (moderate x low)	Possible	Low	No

5.1.3 Short term decline in water quality in the marine environment

Table 5.3 Summary of consequence and risk ratings for potential direct mortality or injury of fish or fisheries values due to a short term decline in water quality in the marine environment during establishment of the Western Basin Expansion reclamation area and BUF

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Species of conservation significance and/or migratory species				
Species of conservation significance and/or migratory fauna species listed under the EPBC Act and/or the NC Act	High (high x moderate)	Unlikely	Medium	No
Other marine reptiles				
Species not listed as having conservation significance under the EPBC Act and/or the NC Act (including Sea snakes and kraits)	Low (low x moderate)	Unlikely	Low	No
Estuarine and coastal fish communities				
Estuarine and coastal fish communities	Moderate (moderate x moderate)	Unlikely	Low	No
Fisheries				
Commercial fisheries	High (high x moderate)	Unlikely	Medium	No
Recreational fisheries	Moderate (moderate x moderate)	Unlikely	Low	No

5.1.4 Potential increase in waste material and marine debris

Table 5.4 Summary of consequence and risk ratings for fish values due to a potential increase in waste material in the marine environment during the establishment of the Western Basin Expansion reclamation area and BUF

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Species of conservation significance and/or migratory species				
Species of conservation significance and/or migratory fauna species listed under the EPBC Act and/or the NC Act	Moderate (high x low)	Unlikely	Low	No

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Other marine reptiles				
Species not listed as having conservation significance under the EPBC Act and/or the NC Act (including Sea snakes and kraits)	Low (low x low)	Unlikely	Low	No
Estuarine and coastal fish communities				
Estuarine and coastal fish communities	Low (moderate x low)	Unlikely	Low	No

5.2 Dredging activities

5.2.1 Short term decline in water quality in the marine environment

Table 5.5 Summary of consequence and risk ratings for potential direct mortality or injury of fish and other marine reptile species due to a short term decline in water quality in the marine environment associated with dredging activities

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Species of conservation significance and/or migratory species				
Species of conservation significance and/or migratory fauna species listed under the EPBC Act and/or the NC Act	High (high x moderate)	Unlikely	Medium	No
Other marine reptiles				
Species not listed as having conservation significance under the EPBC Act and/or the NC Act (including Sea snakes and kraits)	Low (low x moderate)	Unlikely	Low	No
Estuarine and coastal fish communities				
Estuarine and coastal fish communities	Negligible (moderate x negligible)	Unlikely	Negligible	No
Reef fish communities				
Reef fish communities	Low (high x negligible)	Unlikely	Negligible	No
Fisheries				
Commercial fisheries	High (high x moderate)	Unlikely	Medium	No
Recreational fisheries	Moderate (moderate x moderate)	Unlikely	Low	No
Declared Fish Habitat Areas				
Rodds Harbour	Low (high x negligible)	Rare	Negligible	No

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Colosseum Inlet	Low (high x negligible)	Rare	Negligible	No
De-ral-li (Calliope River)	Low (high x negligible)	Rare	Negligible	No

5.2.2 Permanent loss and alteration of habitat

Table 5.6 Summary of consequence and risk ratings for potential direct mortality or injury of fish and other marine reptile species associated with direct loss of alteration of habitat associated with dredging activities

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Species of conservation significance and/or migratory species				
Species of conservation significance and/or migratory fauna species listed under the EPBC Act and/or the NC Act	Moderate (high x low)	Unlikely	Low	No
Other marine reptiles				
Species not listed as having conservation significance under the EPBC Act and/or the NC Act (including Sea snakes and kraits)	Low (low x low)	Unlikely	Low	No
Estuarine and coastal fish communities				
Estuarine and coastal fish communities	Low (moderate x low)	Unlikely	Low	No
Reef fish communities				
Reef fish communities	Low (high x negligible)	Rare	Negligible	No
Fisheries				
Commercial fisheries	Moderate (high x low)	Unlikely	Low	No
Recreational fisheries	Low (moderate x low)	Unlikely	Low	No

5.2.3 Entrapment and direct contact with construction plant

Table 5.7 Summary of consequence and risk ratings for potential direct mortality or injury of fish, sea snake and/or krait species due entrapment in the Western Basin reclamation area and BUF

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Species of conservation significance and/or migratory fauna species listed under the EPBC Act and/or the NC Act	Moderate (high x low)	Unlikely	Low	No
Species not listed as having conservation significance under the EPBC Act and/or the NC Act (including Sea snakes and kraits)	Low (low x low)	Unlikely	Low	No

5.2.4 Potential noise and vibration impacts

Table 5.8 Summary of consequence and risk ratings for potential direct mortality or injury of fish and other marine reptile species due to increases in noise and vibration associated with the dredging activities

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Species of conservation significance and/or migratory species				
Species of conservation significance and/or migratory fauna species listed under the EPBC Act and/or the NC Act	Moderate (high x low)	Unlikely	Low	No
Other marine reptiles				
Species not listed as having conservation significance under the EPBC Act and/or the NC Act (including Sea snakes and kraits)	Low (low x low)	Unlikely	Low	No
Estuarine and coastal fish communities				
Estuarine and coastal fish communities	Low (moderate x low)	Unlikely	Low	No
Reef fish communities				
Reef fish communities	Moderate (high x low)	Unlikely	Low	No
Fisheries				
Commercial fisheries	Moderate (high x low)	Unlikely	Low	No
Recreational fisheries	Low (moderate x low)	Unlikely	Low	No

5.2.5 Potential vessel strike impacts

Table 5.9 Summary of consequence and risk ratings for potential direct mortality or injury of fish and other marine reptile species due to potential vessel strike associated with the dredging activities

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Species of conservation significance and/or migratory fauna species listed under the EPBC Act and/or the NC Act	Moderate (high x low)	Unlikely	Low	No
Species not listed as having conservation significance under the EPBC Act and/or the NC Act (including Sea snakes and kraits)	Low (low x low)	Unlikely	Low	No

5.2.6 Direct contact or entrainment with dredgers

Table 5.10 Summary of consequence and risk ratings for potential direct mortality or injury of fish and other marine reptile species due to direct contact with the dredger or entrainment associated with the dredging activities

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Species of conservation significance and/or migratory fauna species listed under the EPBC Act and/or the NC Act	Moderate (high x low)	Unlikely	Low	No
Species not listed as having conservation significance under the EPBC Act and/or the NC Act (including Sea snakes and kraits)	Low (low x low)	Unlikely	Low	No

5.2.7 Increase in waste material and marine debris

Table 5.11 Summary of consequence and risk ratings for potential direct mortality or injury of fish and other marine reptile species due to a short term decline in water quality in the marine environment associated with dredging activities

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Species of conservation significance and/or migratory species				
Species of conservation significance and/or migratory fauna species listed under the EPBC Act and/or the NC Act	Moderate (high x low)	Unlikely	Low	No
Other marine reptiles				
Species not listed as having conservation significance under the EPBC Act and/or the NC Act (including Sea snakes and kraits)	Low (low x low)	Unlikely	Low	No

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Estuarine and coastal fish communities				
Estuarine and coastal fish communities	Low (moderate x low)	Unlikely	Low	No
Reef communities				
Reef fish communities	Moderate (high x low)	Unlikely	Low	No
Fisheries				
Commercial fisheries	Moderate (high x low)	Unlikely	Low	No
Recreational fisheries	Low (moderate x low)	Unlikely	Low	No

5.3 Removal and installation of navigational aids

5.3.1 Potential noise and vibration impacts

Table 5.12 Summary of consequence and risk ratings for potential direct mortality or injury of fish and other marine reptile species due to impacts associated with noise and vibration associated with the removal and installation of navigation aids

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Species of conservation significance and/or migratory species				
Species of conservation significance and/or migratory fauna species listed under the EPBC Act and/or the NC Act	Moderate (high x low)	Possible	Medium	No
Other marine reptiles				
Species not listed as having conservation significance under the EPBC Act and/or the NC Act (including Sea snakes and kraits)	Low (low x low)	Possible	Low	No
Estuarine and coastal fish communities				
Estuarine and coastal fish communities	Low (moderate x low)	Possible	Low	No
Reef communities				
Reef fish communities	Moderate (high x low)	Possible	Medium	No
Fisheries				
Commercial fisheries	Moderate (high x low)	Possible	Medium	No
Recreational fisheries	Low (moderate x low)	Possible	Low	No

5.4 Stabilisation and maintenance activities

5.4.1 Short term decline water quality in the marine environment

5.4.1.1 Release of contaminants

Table 5.13 Summary of consequence and risk ratings for potential direct mortality or injury of fish and other marine reptile species associated with the release of contaminants associated with maintenance activities on the maintenance activities

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Species of conservation significance and/or migratory fauna species listed under the EPBC Act and/or the NC Act	Moderate (high x low)	Unlikely	Low	No
Species not listed as having conservation significance under the EPBC Act and/or the NC Act (including Sea snakes and kraits)	Low (low x low)	Unlikely	Low	No

5.4.1.2 Soil erosion and sedimentation

Table 5.14 Summary of consequence and risk ratings for potential direct mortality or injury of fish and other marine reptile species associated with soil erosion and sedimentation associated with maintenance activities on the maintenance activities

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Species of conservation significance and/or migratory fauna species listed under the EPBC Act and/or the NC Act	Moderate (high x low)	Unlikely	Low	No
Species not listed as having conservation significance under the EPBC Act and/or the NC Act (including Sea snakes and kraits)	Low (low x low)	Unlikely	Low	No

5.5 Operation of the duplicated shipping channels

- No impacts expected, or risk of potential impacts is negligible

5.6 Maintenance dredging

Table 5.15 Summary of consequence and risk ratings for fish, fisheries values and other marine reptiles for maintenance dredging

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Species of conservation significance and/or migratory species				
Species of conservation significance and/or migratory fauna species listed under the EPBC Act and/or the NC Act	Moderate (high x low)	Unlikely	Low	No
Other marine reptiles				
Species not listed as having conservation significance under the EPBC Act and/or the NC Act (including Sea snakes and kraits)	Low (low x low)	Unlikely	Low	No
Estuarine and coastal fish communities				
Estuarine and coastal fish communities	Negligible (moderate x negligible)	Rare	Negligible	No
Reef fish communities				
Reef fish communities	Moderate (high x low)	Unlikely	Low	No
Fisheries				
Commercial fisheries	Moderate (high x low)	Unlikely	Low	No
Recreational fisheries	Low (moderate x low)	Unlikely	Low	No

6 Soft sediment habitats and benthic macroinvertebrates

6.1 Establishment of the dredged material placement area and BUF

6.1.1 Permanent loss and alteration of habitat

Table 6.1 Summary of consequence and risk ratings for soft sediment habitats and benthic macroinvertebrates for establishment of the Western Basin Expansion reclamation area and BUF

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Soft sediment habitat and benthic macroinvertebrates	Low (low x moderate)	Almost certain	Medium	N/A

6.1.2 Short term decline in water quality in the marine environment

6.1.2.1 Potential impact on soft sediment habitats and benthic macroinvertebrates due to contaminant releases

Table 6.2 Summary of consequence and risk ratings for potential impacts on soft sediment habitats and benthic macroinvertebrates due to contaminant releases associated with the establishment of the Western Basin Expansion reclamation area and BUF

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Soft sediment habitats and benthic macroinvertebrate assemblages	Low (low x moderate)	Unlikely	Low	N/A

6.1.2.2 Increased turbidity and sediment deposition during site establishment works

Table 6.3 Summary of consequence and risk ratings for potential impacts on soft sediment habitats and benthic macroinvertebrates due to sediment releases associated with the establishment of the Western Basin Expansion reclamation area and BUF

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Soft sediment habitats and benthic macroinvertebrates	Low (low x moderate)	Unlikely	Low	N/A

6.2 Dredging activities

6.2.1 Permanent loss of soft sediment habitats and alteration of benthic macroinvertebrate communities

Table 6.4 Summary of consequence and risk ratings for the potential impact on soft sediment habitats and benthic macroinvertebrates due to the permanent loss and alteration of habitat associated with dredging activities

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Soft sediment and benthic macroinvertebrates	Moderate (low x high)	Almost certain	High	N/A

6.2.2 Short term decline in water quality in the marine environment

6.2.2.1 Potential impact on soft sediment habitats and benthic macroinvertebrates due to contaminant releases

Table 6.5 Summary of consequence and risk ratings for the potential impact on soft sediment habitats and benthic macroinvertebrates due to contaminant releases associated with dredging activities

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Soft sediment habitats and benthic macroinvertebrates	Low (low x low)	Unlikely	Low	N/A

6.2.2.2 Increased turbidity and sediment deposition during dredging activities

Table 6.6 Summary of consequence and risk ratings for potential impacts on soft sediment habitats and benthic macroinvertebrates due to sediment deposition during dredging activities

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Soft sediment habitat and benthic macroinvertebrates	Low (low x moderate)	Likely	Medium	N/A

6.2.3 Displacement of macroinvertebrates due to the introduction and spread of invasive species

Table 6.7 Summary of consequence and risk ratings for the potential impacts of invasive species on soft sediment habitats and benthic macroinvertebrates

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Soft sediment habitats and benthic macroinvertebrates	Low (low x low)	Unlikely	Low	N/A

6.3 Removal and installation of navigational aids

6.3.1 Permanent loss and alteration of habitat

Table 6.8 Summary of consequence and risk ratings for the potential impact on soft sediment habitats and benthic macroinvertebrates due to the permanent loss of habitat associated with the removal and installation of navigational aids

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Soft sediment habitats and benthic macroinvertebrates	Negligible (low x negligible)	Almost certain	Low	N/A

6.3.2 Short term decline in water quality in the marine environment due to contaminant releases

Table 6.9 Summary of consequence and risk ratings for the potential impact on soft sediment habitats and benthic macroinvertebrates due to contaminant releases associated with the removal and installation of navigational aids

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Soft sediment habitat and benthic macroinvertebrates	Low (low x low)	Unlikely	Low	N/A

6.4 Stabilisation and maintenance activities

6.4.1 Short term decline in water quality in the marine environment

6.4.1.1 Release of contaminants

Table 6.10 Summary of consequence and risk ratings for the potential impact on soft sediment habitats and benthic macroinvertebrates due to surface stabilisation and maintenance works at the final Western Basin and Western Basin Expansion reclamation area landforms

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Soft sediment habitat and benthic macroinvertebrates	Low (low x low)	Unlikely	Low	N/A

6.4.1.2 Soil erosion and sedimentation

Table 6.11 Summary of consequence and risk ratings for the potential impact on soft sediment habitats and benthic macroinvertebrates due to surface stabilisation and maintenance works at the final Western Basin and Western Basin Expansion reclamation area landforms

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Soft sediment habitat and macroinvertebrates	Low (low x low)	Unlikely	Low	N/A

6.5 Operation of the duplicated shipping channels

- No impacts expected, or risk of potential impacts is negligible

6.6 Maintenance dredging

Table 6.12 Summary of consequence and risk ratings for the potential impact on soft sediment habitats and benthic macroinvertebrates due to maintenance dredging

Sensitive receptor	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Soft sediment habitats and benthic macroinvertebrates	Low (low x low)	Possible	Low	N/A

7 Migratory birds

7.1 Establishment of the dredged material placement area and BUF

7.1.1 Permanent loss and alteration of habitat

7.1.1.1 Context of impact

Table 7.1 Summary of consequence and risk ratings for the direct and permanent loss of migratory shorebird habitat associated with the establishment of the Western Basin Expansion reclamation area and BUF

Conservation significance of species and/or habitat	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Critically endangered or Endangered under the EPBC Act, or important habitat	Very high (very high x moderate)	Almost certain	Very high	Yes (refer Appendix I3)
Vulnerable and/or Migratory under the EPBC Act, or habitat other than important habitat	High (high x moderate)	Almost certain	Very high	Yes (refer Appendix I3)

7.1.2 Direct mortality and injury

Table 7.2 Summary of consequence and risk ratings of the direct mortality and injury of migratory shorebirds due to the establishment of the Western Basin Expansion reclamation area and BUF

Conservation significance of species	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Critically endangered or Endangered under the EPBC Act	Very high (very high x moderate)	Unlikely	High	Yes (refer Appendix I3)
Vulnerable and/or Migratory under the EPBC Act	High (high x moderate)	Unlikely	Medium	No (refer Appendix I3)

7.1.3 Potential noise, vibration and dust impacts

Table 7.3 Summary of consequence and risk ratings of significant changes to migratory shorebird behaviour due to increased noise, dust and/or vibration during establishment of the Western Basin Expansion reclamation area and BUF

Conservation significance of species and/or habitat	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Critically endangered or Endangered under the EPBC Act	Very high (very high x moderate)	Possible	High	Yes (refer Appendix I3)

Conservation significance of species and/or habitat	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Vulnerable and/or Migratory under the EPBC Act	High (high x moderate)	Possible	High	Yes (refer Appendix I3)

7.1.4 Indirect impacts associated with the establishment of the reclamation area

7.1.4.1 Potential increase in waste material and marine debris

Table 7.4 Summary of consequence and risk rating for migratory shorebirds for waste materials entering the marine environment during the establishment of the Western Basin Expansion reclamation area and BUF

Conservation significance of species and/or habitat	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Critically endangered or Endangered under the EPBC Act	High (very high x low)	Unlikely	Medium	Yes (refer Appendix I3)
Vulnerable and/or Migratory under the EPBC Act	Moderate (high x low)	Unlikely	Low	No

7.1.4.2 Hydrological and water quality impacts resulting in habitat alteration

Table 7.5 Summary of consequence and risk ratings for migratory shorebirds and their habitat associated with indirect hydrological and water quality impacts during the establishment of the Western Basin Expansion reclamation area and BUF

Conservation significance of species and/or habitat	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Critically endangered or Endangered under the EPBC Act, and important habitat	Very high (very high x moderate)	Unlikely	High	Yes (refer Appendix I3)
Vulnerable and/or Migratory under the EPBC Act, and habitat other than important habitat	High (high x moderate)	Unlikely	Medium	No

7.1.4.3 Contaminant and sediment releases resulting in impacts on habitat

Table 7.6 Summary of consequence and risk ratings for migratory shorebirds and their habitat associated with contaminant and sediment releases during the establishment of the Western Basin Expansion reclamation area and BUF

Conservation significance of species and/or habitat	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Critically endangered or Endangered under the EPBC Act, and important habitat	Very high (very high x moderate)	Unlikely	High	No

Conservation significance of species and/or habitat	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Vulnerable and/or Migratory under the EPBC Act, and habitat other than important habitat	High (high x moderate)	Unlikely	Medium	No

7.1.4.4 Reduced suitability of migratory shorebird habitat due to the introduction and/or spread of pests and/or weeds

Table 7.7 Summary of consequence and risk ratings for migratory shorebirds and their habitat associated with the introduction or spread of pests and/or weeds during the establishment of the Western Basin Expansion reclamation area and BUF

Conservation significance of species and/or habitat	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Critically endangered or Endangered under the EPBC Act, and important habitat	Very high (very high x moderate)	Unlikely	High	No
Vulnerable and/or Migratory under the EPBC Act, and habitat other than important habitat	High (high x moderate)	Unlikely	Medium	No

7.2 Dredging activities

7.2.1 Potential noise, vibration and dust impacts

Table 7.8 Summary of consequence and risk ratings for noise, dust and vibration impacts on migratory shorebirds and migratory seabirds associated with dredging activities

Conservation significance of species and/or habitat	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Critically endangered or Endangered under the EPBC Act	High (very high x low)	Likely	High	Yes (refer Appendix I3)
Vulnerable and/or Migratory under the EPBC Act	Moderate (high x low)	Likely	Medium	No

7.2.2 Direct mortality and injury due to vessel movements

Table 7.9 Summary of consequence and risk ratings for direct injury and mortality impacts on migratory shorebirds and migratory seabirds associated with dredging activities as a result of marine vessel movements

Conservation significance of species and/or habitat	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Critically endangered or Endangered under the EPBC Act	Very high (very high x moderate)	Unlikely	High	Yes (refer Appendix I3)
Vulnerable and/or Migratory under the EPBC Act	High (high x moderate)	Unlikely	Medium	No

7.2.3 Short term declines in water quality

Table 7.10 Summary of consequence and risk ratings for adverse impacts on migratory shorebirds and migratory seabirds associated with short term declines in water quality during dredging activities

Conservation significance of species and/or habitat	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Critically endangered or Endangered under the EPBC Act, and important habitat	High (very high x low)	Unlikely	Medium	No
Vulnerable and/or Migratory under the EPBC Act, and habitat other than important habitat	Moderate (high x low)	Unlikely	Low	No

7.2.4 Indirect impacts

7.2.4.1 Loss of food sources and impacts on migratory shorebird and migratory seabird prey

Table 7.11 Summary of consequence and risk ratings for indirect adverse impacts on migratory shorebirds and migratory seabirds associated with the loss of food sources during dredging activities

Conservation significance of species and/or habitat	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Critically endangered or Endangered under the EPBC Act, and important habitat	Very high (very high x moderate)	Unlikely	High	No
Vulnerable and/or Migratory under the EPBC Act, and habitat other than important habitat	High (high x moderate)	Unlikely	Medium	No

7.3 Removal and installation of navigational aids

Table 7.12 Summary of consequence and risk ratings for impacts on migratory shorebirds and migratory seabirds associated with the removal and installation of navigational aids

Conservation significance of species and/or habitat	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Critically endangered or Endangered under the EPBC Act	High (very high x low)	Unlikely	Medium	No
Vulnerable and/or Migratory under the EPBC Act	Moderate (high x low)	Unlikely	Low	No

7.4 Stabilisation and maintenance activities

Table 7.13 Summary of consequence and risk ratings for impacts on migratory shorebirds associated with stabilisation and establishment of the final Western Basin and Western Basin Expansion reclamation area landforms

Conservation significance of species and/or habitat	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Critically endangered or Endangered under the EPBC Act	High (very high x low)	Unlikely	Medium	No
Vulnerable and/or Migratory under the EPBC Act	Moderate (high x low)	Unlikely	Low	No

7.5 Operation of the duplicated shipping channels

- No impacts expected, or risk of potential impacts is negligible

7.6 Maintenance dredging

- No impacts expected, or risk of potential impacts is negligible

8 Marine turtles

8.1 Establishment of the dredged material placement area and BUF

8.1.1 Permanent loss and alteration of habitat

Table 8.1 Summary of consequence and risk ratings for marine turtles for permanent loss of intertidal and subtidal habitat during establishment of the Western Basin Expansion reclamation area and BUF

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Almost certain	Very high	Yes (refer Appendix I3)
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	Yes (refer Appendix I3)
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	Very High (very high x moderate)	Rare	Medium	Yes (refer Appendix I3)
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	Very High (very high x moderate)	Rare	Medium	Yes (refer Appendix I3)

8.1.2 Potential noise impacts

Table 8.2 Summary of consequence and risk ratings for marine turtles for noise during establishment of the Western Basin Expansion reclamation area and BUF

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Possible	Medium	No
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Possible	Medium	No
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Unlikely	Medium	No
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Unlikely	Medium	No

8.1.3 Short term decline in water quality in the marine environment

Table 8.3 Summary of consequence and risk ratings for marine turtles for short term decline in water quality during establishment of the Western Basin Expansion reclamation area and BUF

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	No
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	No
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	Very High (very high x moderate)	Rare	Medium	No
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	Very High (very high x moderate)	Rare	Medium	No

8.1.4 Entrapment and direct contact with construction plant

Table 8.4 Summary of consequence and risk ratings for marine turtles for entrapment and direct contact with construction plant during establishment of the Western Basin Expansion reclamation area and BUF

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No

8.1.5 Potential artificial lighting impacts

Table 8.5 Summary of consequence and risk ratings for marine turtles for artificial lighting impacts during establishment of the Western Basin Expansion reclamation area and BUF

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No

8.1.6 Potential increase in waste material and marine debris

Table 8.6 Summary of consequence and risk ratings for marine turtles for waste materials entering the marine environment during establishment of the Western Basin Expansion reclamation area and BUF

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No

8.2 Dredging activities

8.2.1 Permanent loss and alteration of habitat

Table 8.7 Summary of consequence and risk ratings for marine turtles for permanent loss of benthic substrate at the areas to be dredged

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	No
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	No
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	Very high (very high x moderate)	Rare	Medium	No
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	Very high (very high x moderate)	Rare	Medium	No

8.2.2 Potential underwater noise impacts

Table 8.8 Summary of consequence and risk ratings for marine turtles for increased noise during dredging activities

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Low	No
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No

8.2.3 Potential vessel strike impacts

Table 8.9 Summary of consequence and risk ratings for marine turtles for potential vessel strike during dredging activities

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No

8.2.4 Direct contact with dredging equipment

Table 8.10 Summary of consequence and risk ratings for potential direct contact with dredging equipment impacting on marine turtles during dredging activities

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No

8.2.5 Short term decline in water quality in the marine environment

Table 8.11 Summary of consequence and risk ratings for marine turtles for short term decline in water quality during dredging activities

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	No
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	No
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	Very High (very high x moderate)	Rare	Medium	No
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	Very High (very high x moderate)	Rare	Medium	No

8.2.6 Potential artificial lighting impacts

Table 8.12 Summary of consequence and risk ratings for marine turtles for artificial lighting impacts during dredging activities

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Rare	Low	No
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No

8.2.7 Increase in waste material and marine debris

Table 8.13 Summary of consequence and risk ratings for marine turtles for waste materials entering the marine environment during dredging activities

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No

8.3 Removal and installation of navigational aids

8.3.1 Noise and vibration impacts

Table 8.14 Summary of consequence and risk ratings for increased noise and vibration impacting on marine turtles during removal and installation of navigational aids

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Possible	Medium	No
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Possible	Medium	No
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Unlikely	Medium	No
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Unlikely	Medium	No

8.4 Stabilisation and maintenance activities

8.4.1 Short term decline water quality

8.4.1.1 Release of contaminants

Table 8.15 Summary of consequence and risk ratings for marine turtles for release of contaminants during stabilisation and maintenance activities

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No

8.4.1.2 Soil erosion and sedimentation

Table 8.16 Summary of consequence and risk ratings for marine turtles for a release of sediment laden runoff to marine waters during stabilisation and final Project landforms

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No

8.5 Operation of the duplicated shipping channels

- No impacts expected, or risk of potential impacts is negligible

8.6 Maintenance dredging

Table 8.17 Summary of consequence and risk ratings for marine turtles for maintenance dredging

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Green turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Flatback turtle (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Hawksbill turtle (Vulnerable, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No
Loggerhead turtle (Endangered, Migratory (EPBC Act), Endangered (NC Act))	High (very high x low)	Rare	Medium	No

9 Marine mammals

9.1 Establishment of the dredged material placement area and BUF

9.1.1 Permanent loss and alteration of habitat

9.1.1.1 Dugongs

Table 9.1 Summary of consequence and risk ratings for dugongs for permanent loss of intertidal and subtidal habitat during establishment of the Western Basin Expansion reclamation area and BUF

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Dugong (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Almost certain	Very high	Yes (refer Appendix I3)

9.1.1.2 Dolphins

Table 9.2 Summary of consequence and risk ratings for dolphins for a permanent loss of habitat associated with the establishment of the Western Basin Expansion reclamation area and BUF

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Australian humpback dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Almost certain	Very high	Yes (refer Appendix I3)
Australian snubfin dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Rare	Medium	No
Coastal bottlenose dolphin, Indian Ocean bottlenose dolphin (no conservation significance)	Low (low x moderate)	Unlikely	Low	N/A

9.1.2 Potential noise impacts

9.1.2.1 Dugongs

Table 9.3 Summary of consequence and risk ratings for dugongs due to noise impacts associated with the establishment of the Western Basin Expansion reclamation area and BUF

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Dugong (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No

9.1.2.2 Dolphins

Table 9.4 Summary of consequence and risk ratings for dolphins due to noise impacts associated with the establishment the Western Basin Expansion reclamation area and BUF

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood	Risk rating	Potential to contribute to key threatening process
Australian humpback dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Australian snubfin dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Rare	Low	No
Coastal bottlenose dolphin (no conservation significance) Indian Ocean bottlenose dolphin (no conservation significance)	Low (low x low)	Unlikely	Low	No

9.1.2.3 Whales

Table 9.5 Summary of consequence and risk ratings for whales due to noise impacts associated with establishment of the Western Basin Expansion reclamation area and BUF

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Humpback whale (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Rare	Low	No

9.1.3 Short term decline in water quality in the marine environment

9.1.3.1 Dugongs

Table 9.6 Summary of consequence and risk ratings for dugongs for a potential short term decline in water quality during establishment of the Western Basin Expansion reclamation area and BUF

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Dugong (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	No

9.1.3.2 Dolphins

Table 9.7 Summary of consequence and risk ratings for dolphins for a potential short term decline in water quality during establishment of the Western Basin Expansion reclamation area and BUF

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Australian humpback dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	No
Australian snubfin dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Rare	Medium	No
Coastal bottlenose dolphin (no conservation significance) Indian Ocean bottlenose dolphin (no conservation significance)	Low (low x moderate)	Unlikely	Low	No

9.1.4 Entrapment and direct contact with construction plant

9.1.4.1 Dugongs

Table 9.8 Summary of consequence and risk ratings for dugongs for entrapment or direct contact with construction plant during establishment of the Western Basin Expansion reclamation area and BUF

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Dugong (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	No

9.1.4.2 Dolphins

Table 9.9 Summary of consequence and risk ratings for dolphins for entrapment or direct contact with construction plant during establishment of the Western Basin Expansion reclamation area and BUF

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Australian humpback dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x moderate)	Unlikely	Low	No
Australian snubfin dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x moderate)	Rare	Low	No
Coastal bottlenose dolphin (no conservation significance) Indian Ocean bottlenose dolphin (no conservation significance)	Low (low x moderate)	Unlikely	Low	No

9.1.5 Potential increase in waste material and marine debris

9.1.5.1 Dugongs

Table 9.10 Summary of consequence and risk ratings for dugongs for waste materials entering the marine environment during establishment of the Western Basin Expansion reclamation area and BUF

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood	Risk rating	Potential to contribute to key threatening process
Dugong (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	No

9.1.5.2 Dolphins

Table 9.11 Summary of consequence and risk ratings for dolphins for waste materials entering the marine environment during establishment of the Western Basin Expansion reclamation area and BUF

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Australian humpback dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	No
Australian snubfin dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Rare	Medium	No
Coastal bottlenose dolphin (no conservation significance) Indian Ocean bottlenose dolphin (no conservation significance)	Low (low x moderate)	Unlikely	Low	No

9.1.5.3 Whales

Table 9.12 Summary of consequence and risk ratings for whales for potential waste materials entering the marine environment during establishment of the Western Basin Expansion reclamation area and BUF

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Humpback whale (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Rare	Medium	No

9.2 Dredging activities

9.2.1 Permanent loss and alteration of habitat

9.2.1.1 Dugongs

Table 9.13 Summary of consequence and risk ratings for dugongs from a permanent loss of benthic substrate at the channel duplication areas to be dredged

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Dugong (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	No

9.2.1.2 Dolphins

Table 9.14 Summary of consequence and risk ratings for dolphins from a permanent loss of benthic substrate at the channel duplication areas to be dredged

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Australian humpback dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Almost certain	High	Yes (refer Appendix I3)
Australian snubfin dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Rare	Low	No
Coastal bottlenose dolphin (no conservation significance) Indian Ocean bottlenose dolphin (no conservation significance)	Low (low x low)	Almost certain	Medium	No

9.2.1.3 Whales

Table 9.15 Summary of consequence and risk ratings for whales for a permanent loss of benthic substrate at the areas to be dredged

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Humpback whale (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Very high (high x low)	Rare	Low	No

9.2.2 Potential noise and vibration impacts

9.2.2.1 Dugongs

Table 9.16 Summary of consequence and risk ratings for dugongs for increased noise during dredging activities

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Dugong (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No

9.2.2.2 Dolphins

Table 9.17 Summary of consequence and risk ratings for dolphins for increased noise during dredging activities

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Australian humpback dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Australian snubfin dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Rare	Low	No
Coastal bottlenose dolphin (no conservation significance) Indian Ocean bottlenose dolphin (no conservation significance)	Low (low x low)	Unlikely	Low	No

9.2.2.3 Whales

Table 9.18 Summary of consequence and risk ratings for whales for increased noise during dredging activities

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Humpback whale (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Rare	Low	No

9.2.3 Short term decline in water quality in the marine environment

9.2.3.1 Dugongs

Table 9.19 Summary of consequence and risk ratings for dugongs for a short term decline in water quality during dredging activities

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Dugong (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	No

9.2.3.2 Dolphins

Table 9.20 Summary of consequence and risk ratings for dolphins for a short term decline in water quality during dredging activities

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Australian humpback dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	No
Australian snubfin dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Rare	Medium	No
Coastal bottlenose dolphin (no conservation significance) Indian Ocean bottlenose dolphin (no conservation significance)	Low (low x moderate)	Unlikely	Low	No

9.2.3.3 Whales

Table 9.21 Summary of consequence and risk ratings for whales for a short term decline in water quality during dredging activities

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Humpback whale (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Rare	Medium	No

9.2.4 Potential vessel strike impacts

9.2.4.1 Dugongs

Table 9.22 Summary of consequence and risk ratings for dugongs for potential vessel strike during dredging activities

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Dugong (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	No

9.2.4.2 Dolphins

Table 9.23 Summary of consequence and risk ratings for dolphins for potential vessel strike during dredging activities

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Australian humpback dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Unlikely	Medium	No
Australian snubfin dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Rare	Medium	No
Coastal bottlenose dolphin (no conservation significance) Indian Ocean bottlenose dolphin (no conservation significance)	Low (low x moderate)	Unlikely	Low	No

9.2.4.3 Whales

Table 9.24 Summary of consequence and risk ratings for whales for potential vessel strike during dredging activities

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Humpback whale (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	High (high x moderate)	Rare	Medium	No

9.2.5 Direct contact with dredging equipment

9.2.5.1 Dugongs

Table 9.25 Summary of consequence and risk ratings for dugongs for potential direct contact with dredging equipment during dredging activities

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Dugong (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No

9.2.5.2 Dolphins

Table 9.26 Summary of consequence and risk ratings for dolphins for potential direct contact with dredging equipment during dredging activities

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Australian humpback dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Australian snubfin dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Rare	Low	No
Coastal bottlenose dolphin (no conservation significance) Indian Ocean bottlenose dolphin (no conservation significance)	Low (low x low)	Unlikely	Low	No

9.2.5.3 Whales

Table 9.27 Summary of consequence and risk ratings for whales for potential direct contact with dredging equipment during dredging activities

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Humpback whale (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Rare	Low	No

9.2.6 Increase in waste material and marine debris

9.2.6.1 Dugongs

Table 9.28 Summary of consequence and risk ratings for dugongs for a potential increase in waste material and marine debris during dredging activities

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Dugong (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No

9.2.6.2 Dolphins

Table 9.29 Summary of consequence and risk ratings for potential impacts for dolphins as a result of waste materials entering the marine environment during dredging activities

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Australian humpback dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Australian snubfin dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Rare	Low	No
Coastal bottlenose dolphin (no conservation significance) Indian Ocean bottlenose dolphin (no conservation significance)	Low (low x low)	Unlikely	Low	No

9.2.6.3 Whales

Table 9.30 Summary of consequence and risk ratings for whales for potential waste materials entering the marine environment during dredging activities

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Humpback whale (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Rare	Low	No

9.3 Removal and installation of navigational aids

9.3.1 Noise and vibration

9.3.1.1 Dugongs

Table 9.31 Summary of consequence and risk ratings for dugongs for increased noise and vibration during removal and installation of navigational aids

Conservation significance	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Dugong (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Possible	Medium	No

9.3.1.2 Dolphins

Table 9.32 Summary of consequence and risk ratings for dolphins for increased noise and vibration during removal and installation of navigational aids

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Australian humpback dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Possible	Medium	No
Australian snubfin dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Rare	Low	No
Coastal bottlenose dolphin (no conservation significance) Indian Ocean bottlenose dolphin (no conservation significance)	Low (low x low)	Possible	Low	No

9.3.1.3 Whales

Table 9.33 Summary of consequence and risk ratings for whales for increased noise and vibration during removal and installation of navigational aids

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Humpback whale (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Rare	Low	No

9.4 Stabilisation and maintenance activities

9.4.1 Short term decline in water quality in the marine environment

9.4.1.1 Dugongs

Table 9.34 Summary of consequence and risk ratings for dugongs for a short term decline in water quality during stabilisation and final Project landform

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Dugong (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No

9.4.1.2 Dolphins

Table 9.35 Summary of consequence and risk ratings for dolphins for a short term decline in water quality during stabilisation and final Project landform

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Australian humpback dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Australian snubfin dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Rare	Low	No
Coastal bottlenose dolphin (no conservation significance) Indian Ocean bottlenose dolphin (no conservation significance)	Low (low x low)	Unlikely	Low	No

9.4.1.3 Whales

Table 9.36 Summary of consequence and risk ratings for whales for a short term decline in water quality during stabilisation and final Project landform

Species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Humpback whale (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Rare	Low	No

9.5 Operation of the duplicated shipping channels

- No impacts expected, or risk of potential impacts is negligible

9.6 Maintenance dredging

Table 9.37 Summary of consequence and risk ratings for marine mammals for maintenance dredging

Marine mammal species (conservation significance)	Consequence rating (sensitivity x magnitude)	Likelihood of impact	Risk rating	Potential to contribute to key threatening process
Dugongs				
Dugongs (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Dolphins				
Australian humpback dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Unlikely	Low	No
Australian snubfin dolphin (Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Rare	Low	No
Coastal bottlenose dolphin (no conservation significance) Indian Ocean bottlenose dolphin (no conservation significance)	Low (low x low)	Unlikely	Low	No
Whales				
Humpback whale (Vulnerable, Migratory (EPBC Act), Vulnerable (NC Act))	Moderate (high x low)	Rare	Low	No