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23 Conclusion

This chapter replaces the Project EIS Chapter 23 (conclusion).

23.1 Overview

The Project EIS and AEIS have been prepared to assess the environmental, social, cultural heritage and economic impacts associated with the Port of Gladstone Gatcombe and Golding Cutting Channel Duplication Project (the Project).

The Project involves the duplication of the existing Gatcombe and Golding Cutting shipping channels to provide a duplicated channel parallel to the main shipping channels with sufficient depth and width to allow improved two-way passage into the Port under all weather and tidal conditions. The duplication involves the deepening and widening of the existing Gatcombe and Golding Cutting bypass shipping channels, resulting in two shipping channels of the same depth to allow vessel passing. The Project involves the dredging of seabed material within the Port of Gladstone and the placement of dredged material for beneficial reuse purposes within the Port.

The Project is required to improve the operational and economic efficiency of the Port of Gladstone by reducing vessel incident risk as Port throughput and associated vessel numbers increase, in particular as the portion of Capesize vessels (large bulk carriers used for both import and export) increases into the future. Improving the tidal constraints for bulk carrier vessel movements allows improved flexibility for vessel passing within the Port.

The improved Port operational efficiencies will enable substantial economic benefits for the region to be realised by enabling future resource and industry growth within the catchment of the Port of Gladstone.

It is important to note that while the Project will facilitate an improvement in the existing and future vessel movement efficiency, and a reduction in the likelihood of vessel incident risk, the duplication of the Gatcombe and Golding Cutting Channels will not have any direct influence on increasing commercial vessel movement numbers within the Port.

The Project EIS has been prepared to address the statutory requirements under the SDPWO Act and the EPBC Act. The EIS responds to the Terms of Reference (ToR) for the Project EIS, issued by the Queensland Coordinator-General in November 2012, and the EIS Guidelines issued by the Commonwealth Environment Minister in March 2013.

GPC has engaged with a range of stakeholders and community members during the preparation of the EIS. Engagement has focussed on people and stakeholders who have the greatest potential to be impacted by the Project activities.

The Project EIS was placed on public notification from 8 April 2019 to 23 May 2019. Table 23.1 summarises the number of submissions and submitter types received during the Project EIS statutory notification process.

Table 23.1 Summary of submissions received during the Environmental Impact Statement public notification process

EIS process	Submitter type	Number of submissions
SDPWO Act	Government agency	11
	Non-government organisation (Gladstone Conservation Council)	1
	Private submitter	1
SDPWO Act total		13

EIS process	Submitter type	Number of submissions
EPBC Act	Private submitters	8
	Non-government organisation (Gladstone Conservation Council)	1
EPBC Act total		9

This AEIS responds to the Coordinator-General's request to provide further clarification on specific matters raised during the SDPWO Act statutory notification for the Project EIS, and also responds to the submissions received under the EPBC Act public notification for the Project EIS.

23.2 Environmental Impact Statement findings

The EIS assessment for each environmental aspect has been undertaken in accordance with the requirements outlined in the EIS ToR and the EIS Guidelines. The EIS applied an impact assessment methodology that is appropriate for each environmental, social, cultural heritage and economic aspect, including an appropriate compliance, risk or significance assessment. Impact assessment has been undertaken for the Project activities over both direct and indirect impact areas where relevant. A summary of the findings of each environmental aspect assessment undertaken for the EIS is provided below with particular focus on residual and unavoidable impacts, after mitigation and management measures are implemented.

23.2.1 Land use and tenure

- The Project is consistent with relevant State and regional land use planning instruments, including State Planning Policies, Central Queensland Regional Plan, Master Plan for the priority Port of Gladstone 2018 and the GPC Land Use Plan 2012
- GPC will apply for a lease over the WBE reclamation area and BUF in advance of applying for ownership in freehold. GPC will also consider Native Title matters under the existing ILUA as part of seeking tenure over the WBE reclamation area and BUF.

23.2.2 Visual amenity

- The establishment of the WBE reclamation area and BUF would impact on the visual aesthetic values of a small portion of the Great Barrier Reef World Heritage Area (GBRWHA) within the Port of Gladstone. The broader visual aesthetic values of the GBRWHA will be maintained beyond the Port limits.
- The potential for adverse visual amenity impacts are primarily associated with the creation of the WBE reclamation area and BUF, where a permanent change to the visual landscape and amenity will occur, over short distance views from Yarwun, Friend Point, The Narrows and the Port near the existing Western Basin reclamation area.
- The WBE reclamation area will create new Port land generating a permanent visual change for which there are limited mitigation opportunities
- The changes to the landscape from the Project are consistent with the character of the existing industrial dominant landscape of the Port of Gladstone and therefore potential visual amenity impacts are assessed as moderate and acceptable.

23.2.3 Topography, geology and soils

- There is potential for impacts related to oxidation of PASS material and subsequent increase in acidity and migration of metals/metalloids into the marine water

- There is potential for land contamination during Western Basin and WBE reclamation area activities and dredged material unloading at the BUF associated with the storage and use of oils, fuels, chemicals and hazardous materials from the operation of machinery, vehicles and other equipment
- The risk of PASS on human health and environmental values will be managed by implementing the ASS Management Plan. The potential for land contamination will be managed under the Project EMP.
- The potential impacts related to topography, geology and soils are assessed as low.

23.2.4 Sediment quality

- The resuspension of sediment and mobilisation of contaminants during reclamation area bund wall and BUF construction, dredging activities and unloading and placement of dredged material may result in minor localised impacts to sediment quality
- The dredging material is deemed suitable for a future port-related industrial land use
- The risk to human health and environmental values from potential sediment quality impact will be effectively managed by implementing the Project EMP and Dredging EMP, and the impacts are assessed as low.

23.2.5 Coastal processes and hydrodynamics

- The permanent changes to coastal processes and hydrodynamics associated with the Project will be small in magnitude and the associated risks have been determined to be in the low to medium hazard risk categories
- Due to the certain and unavoidable nature of the changes to bathymetry and geometry, specific mitigation measures to deal with coastal processes and hydrodynamic impacts are not proposed. As the potential impacts identified are negligible to low in consequence, the impacts are acceptable.
- The most significant coastal processes changes will occur in the immediate vicinity of the WBE reclamation area. Further coastal processes and hydrodynamic modelling of the WBE reclamation area bund wall and construction sequences will be undertaken during the detailed design phase of the Project, and a monitoring program will be implemented to manage any observed impacts in the channels and along the shoreline adjacent to the new reclamation area.

23.2.6 Water quality

- The main impacts from the Project are increased turbidity and sedimentation, and the potential release of contaminants. These changes to water quality conditions have the potential to result in impacts to sensitive ecological receptors such as seagrass meadows, coral reef communities, marine flora and fauna as well as other environmental and recreational values.
- The Project coastal processes and hydrodynamic modelling results indicate that water level impacts will be negligible. Velocity impacts will be moderate in channels adjacent to the WBE reclamation area, but small in the vicinity of the deepened shipping channels. Wave climate impacts will be limited to the immediate vicinity of the WBE reclamation area. Sedimentation impacts will be most significant adjacent to the WBE reclamation area, but there will also be a slight increase in overall annual Port maintenance dredging requirements.
- The modelling was used to simulate the full dredging program and the expected impacts to the turbidity percentiles and deposition rates due to dredging were assessed. The model indicates that increases to the turbidity and deposition rate statistics are expected near the WBE reclamation area and in the vicinity of the TSHD operating in the Gatcombe and Golding Cutting Channels.

- The low levels of potential contaminants within the dredged material are unlikely to pose any significant risk to water quality and the receiving environment. Other potential impacts include localised turbidity associated with reclamation area bund wall and BUF construction and the installation and removal of navigational aids.
- Effective implementation of the mitigation measures through the Project EMP and Dredging EMP result in water quality risks to human health and environmental values assessed as low to moderate and acceptable.

23.2.7 Nature conservation

- The establishment of the WBE reclamation area and BUF will not result in the direct and permanent loss of Coastal Saltmarsh threatened ecological community (TEC), mangrove communities and terrestrial vegetation communities
- The construction of the WBE reclamation area and BUF will result in the permanent loss of 278.20ha, of the mapped Port Curtis DIWA wetland area and the permanent loss of 73.61ha, of the mapped Queensland high ecological significance (HES) wetlands (matters of state environmental significance (MSES)) within Port Curtis
- The establishment of the WBE reclamation area and BUF will result in the direct and permanent loss of seagrass meadows and macroalgae of approximately 374.64ha. The area to be dredged will result in the direct and permanent loss of seagrass meadows and macroalgae of approximately 85.33ha. There are no other potential Project direct impacts to any other marine plants.
- The establishment of the WBE reclamation area and BUF will not result in the loss of known reef communities. There are no reef communities known from the Western Basin zone, and therefore there are no expected impacts on reef communities as a result of the establishment of the WBE reclamation area and BUF.
- Port Curtis contains ecologically important fisheries and other marine reptile habitats, including the declared Fish Habitat Areas (FHAs) located at Colosseum Inlet, Rodds Harbour, and the upper reaches of the Calliope Creek. The FHAs are not located in the Project direct impact areas, and are not expected to be significantly impacted as a result of the Project activities. Whilst the direct loss of inshore habitat from the establishment of the WBE reclamation area and BUF have the potential to impact on fisheries values, due to the extent of other Port Curtis seagrass meadows, mangrove communities and other inshore areas identified as having fisheries importance, this Project direct loss of inshore habitat will not result in any significant impacts on Port Curtis fish, other marine reptiles or fisheries values.
- Dredging activities will result in a temporary loss and mobilisation of benthic macroinvertebrates from within the dredging footprint, with benthic macroinvertebrates anticipated to recolonise the deepened channel footprint
- The WBE reclamation area will result in permanent loss of approximately 275.37ha of potential migratory shorebird foraging habitat as well as potential indirect impacts of approximately 203.93ha. The habitat within the WBE reclamation area is foraging habitat in close proximity to a number of important roosting habitats for migratory shorebird species, and is therefore likely important foraging habitat for birds utilising these roosts.
- The establishment of the WBE reclamation area and BUF will not involve the direct and permanent loss of intertidal or terrestrial vegetation. The establishment of the WBE reclamation area and BUF, including the placement of dredged material, will result in the permanent loss of exposed mudflats and benthic habitats which provide foraging habitat for resident shorebird species and intertidal fauna species.

- The most notable potential impact to marine turtles from the Project is the direct and permanent loss of coastal seagrass habitat as a result of the WBE reclamation area and dredging activities. As a result, the Project activities are likely to result in a significant residual adverse impact on Green turtle foraging habitat due to the direct disturbance on seagrass meadows and macroalgae (i.e. 374.64ha associated with direct and indirect impacts from the WBE reclamation area and 85.33ha associated with direct impacts from the channel duplication area to be dredged). Project activities are unlikely to result in a significant residual adverse impact on the Flatback turtle, Loggerhead turtle, Hawksbill turtle and Olive ridley turtle. The Project will implement mitigation measures provided in the Dredging EMP and Project EMP (refer AEIS Appendices F and G, respectively), and associated management plans to reduce the likelihood and magnitude of potential Project impacts on marine turtles.
- The most notable potential impact to marine mammals from the Project is the direct and permanent loss of coastal seagrass habitat as a result of the establishment of the WBE reclamation area and dredging activities. As such the Project activities are likely to have a significant residual adverse impact on the dugong due to the direct loss of seagrass meadows (loss of 374.64ha at the WBE reclamation area and 35.65ha at the area to be dredged). Based on the assessment, the Project activities are unlikely to have a significant adverse impact on dolphins or whales due to no direct impact to habitat or reproduction cycle. The Project will implement mitigation measures provided in the Dredging EMP and Project EMP (refer AEIS Appendices F and G, respectively), and associated management plans to reduce the likelihood and magnitude of potential Project impacts on marine mammals.
- The outstanding universal value (OUV) of the GBRWHA that have the potential to be impacted by the Project at the local level (i.e. local expression of OUV) include marine water quality, dugong, seagrass meadows, shorebirds and migratory birds. Of these locally expressed values, only the local expression of shorebirds and migratory birds contributes significantly to the overall OUV of the GBRWHA.
- The Project will not result in the loss of one or more World Heritage and National Heritage values, and also these values will not be notably altered, modified, obscured or diminished by Project activities
- The EIS significant residual adverse impact assessments have concluded that the establishment of the WBE reclamation area and dredging activities will result in a significant residual adverse impact on:
 - Migratory shorebird foraging habitat, including for threatened migratory shorebirds (loss of 479.30ha) (matters of national environmental significance (MNES) and MSES)
 - Seagrass meadows and macroalgae (loss of 374.64ha at WBE reclamation area and loss of 85.33ha at the channel duplication area to be dredged) (MSES)
 - HES wetlands (loss of 73.61ha) (MSES)
 - Green turtle foraging habitat (loss of 374.64ha at WBE reclamation area and loss of 35.65ha at the channel duplication area to be dredged) (MSES)
 - Dugong foraging habitat (loss of 374.64ha at WBE reclamation area and loss of 35.65ha at the channel duplication area to be dredged) (MSES)
 - Beach stone curlew (resident shorebird) foraging habitat (loss of 479.30ha) (MSES).
- A Channel Duplication Project Draft Offset Strategy has been developed as part of this AEIS to mitigate the above significant residual adverse impacts on ecological values (refer AEIS Appendix E4).

23.2.8 Water resources

- There is a very low risk of groundwater resources being affected as a result of Project activities
- There will be no direct impact on the fresh water resources identified upstream of the Western Basin and WBE reclamation areas
- Dredging activities and installation of navigational aids will occur in tidal waters and therefore effects on water resources are predicted to be negligible.

23.2.9 Climate change

- The short term potential impacts of climate change on the Project relate to higher intensity tropical storms or cyclones causing delays to activities or in the worst instance injury or death
- Longer term potential impacts relate to the structural integrity of the WBE reclamation area due to higher temperatures and evaporation rates, lower average rainfall, sea level rise and more intense storm/cyclone systems. More frequent maintenance dredging may be required as a consequence of more intense storm/cyclone systems causing increased sediment loading.
- The potential impacts of climate change, including predicted sea level change and storm tide have been incorporated into the concept design for the Project and further analysis will be undertaken at the detailed design phase, particularly for the WBE reclamation area bund wall and BUF.

23.2.10 Air quality and greenhouse gas emissions

- Emissions arising from the Project are predicted to comply with relevant air quality objectives. Dust emissions from the Project are predicted to be highest during dredging due to the transport of dredged material from the BUF to the reclamation areas in haul trucks. Potential air quality and dust effects would be managed through the Air Quality Management Plan as part of the Project EMP and the Dredging EMP.
- Greenhouse gas (GHG) emissions under GPC's control would temporarily increase GPC's annual GHG emissions. Most GHG emissions would occur as a result of dredging activities and are likely to be under the Government's Clean Energy Regulator Safeguard Mechanism trigger. GHG emissions during dredging activities would be mitigated through fuel efficiency initiatives, such as equipment selection and maximising payload weight of construction vehicles.
- Impacts on air quality as a result of the Project activities are predicted to be low.

23.2.11 Noise and vibration

- Predicted noise levels for sensitive receptors from most Project activities would be below the current ambient noise levels due to separation distances between the noise source and sensitive receptors. Noise effects may be experienced by sensitive receptors at Facing Island and Boyne Island as a result of the TSHD dredging operations (including the use of pushbusters) and installation of new navigational aids.
- Piling noise associated with the installation of navigational aids is predicted to potentially cause injury to marine fauna species if they remain in close proximity to the piling location for sustained periods. Acoustic monitoring and effective mitigation measures will be implemented to minimise the installation of navigational aids piling noise impact on assessed marine fauna species.
- With the effective implementation of the mitigation measures, the impacts of noise and vibration are predicted to be low.

23.2.12 Waste

- The generation of waste from the Project activities is expected to be minimal due to the dredged material being beneficially reused within the Western Basin and WBE reclamation areas, the construction materials for the bund wall and BUF being sourced locally, and the construction workforce being relatively low.
- Potential impacts from uncontrolled waste can be managed through the implementation of the Project EMP and Dredging EMP
- With these measures effectively implemented, the waste risks to human health and environmental values are assessed as being low to medium and acceptable.

23.2.13 Transport

- There will be short term traffic changes on Guerassimoff Road and Landing Road during the construction of the bund walls for the WBE reclamation area and BUF. The existing condition of these roads and existing intersection treatments have adequate capacity to accommodate the anticipated traffic. Potential effects on road safety would be managed through temporary traffic speed reduction and variable message signage.
- During dredging and following construction of the WBE reclamation area and BUF, there would be a minor reduction in navigable waterway within the Port. This would not compromise maritime safety or the safe navigation of vessels. During capital dredging, the Project would result in a small increase in vessel movements in the Port. This would have a negligible effect on existing and likely future vessel movements in the Port.
- The transport impacts from the majority of Project activities are predicted to be low with moderate and acceptable impacts predicted for the short term haulage of rock material for bund wall construction associated with the WBE reclamation area and BUF.

23.2.14 Aboriginal cultural heritage

- Consultation with PCCC Native Title claimant group was carried out to inform the Aboriginal cultural heritage assessment. Values expressed during consultation related to known and potential cultural heritage sites, cultural activities such as fishing, knowledge transfer in the Port Curtis area and obtaining food, and environmental integrity of the marine environment. These values were considered during the options assessment for dredged material placement.
- The PCCC participants acknowledged that the WBE reclamation area should not impinge on the coastal fringe and that the existing buffer between the shoreline and proposed development area be maintained
- Due to the majority of Project activities being within tidal waters, the potential for impact on known sites of cultural heritage significance is predicted to be low
- A range of mitigation measures are proposed to manage potential Aboriginal cultural heritage impacts, including monitoring, discovery and consultation measures under the existing Cultural Heritage Protocol established under the ILUA, to which GPC is a signatory.

23.2.15 Non-Aboriginal cultural heritage

- The closest listed non-Aboriginal places and sites are unlikely to be affected by Project activities due to the majority of the Project activities occurring in tidal waters
- The heritage values of the Great Barrier Reef will be protected through Project mitigation measures which aim to protect ecological values within the Project impact areas

- Recorded shipwrecks sites within 5km of the Project may be indirectly affected during construction through potential indirect sediment deposition and/or physical damage from Project activities will be managed through the implementation of the Project EMP and Dredging EMP
- Potential effects on non-Aboriginal cultural heritage are predicted to be negligible to low.

23.2.16 Social

- The social impacts of Project activities would mainly occur during construction and would be temporary and short term. Social effects would vary for different groups, depending on proximity to the Project and dependence on the marine environment. Those located close to the Project are most likely to experience the short term changes.
- Commercial and recreational fishers, tourism operations and other maritime uses have the potential to be impacted by the Project construction activities, particularly if there is a decline in water quality causing a change in the location of fish stocks. This was identified by commercial fishers, tourism operators and by Traditional Owner representatives.
- Capital and maintenance dredging of seabed material and beneficial placement of dredged material within the Western Basin and WBE reclamation areas have the potential to impact Traditional Owner values
- The impacts on social values as a result of Project activities is assessed as being low. There are also likely to be low to negligible effects as a result of the workforce influx required for the Project due to the relatively small size of the construction workforce.
- Social and community impacts from the Project will be minimised through the implementation of the Social Impact Management Plan.

23.2.17 Economic

- There is potential for \$250 million investment in the Project, which would result in the employment of 2,906 people, income generation of \$287 million and economic growth of more than \$502 million. This would contribute a 0.15% to the Gross State Product (GSP) of Queensland and 10.5% to the Gross Regional Product (GRP) of Gladstone.
- There is likely to be a significant positive effect on the Queensland and the Gladstone regional economy as a result of the Project.

23.2.18 Hazard and risk

- The design, construction and maintenance of the Project are covered by an extensive regulatory and hazard management framework, including health and safety requirements. The management of health and safety risks is an integral part of GPC's core functions which the Project will comply with.
- The construction and maintenance hazards and risks identified for the Project have a low to medium residual risk rating due to these hazards and risks being well known and already addressed by GPC systems and procedures.

23.2.19 Cumulative impact

- Results of the cumulative impact assessment indicate that significant cumulative impacts from the Project combined with reasonably foreseeable 'other projects' are unlikely
- Some environmental values are sensitive to the cumulative impacts of the Project combined with exogenous factors such as episodic climatic events, particularly floods and/or coral bleaching events. These cumulative risks primarily relate to seagrass, benthic habitats, marine turtles and dugongs.

- The 'other projects' considered in the cumulative impact assessment are unlikely to have significant impacts on non-biological values (i.e. socio-economic values), that will act cumulatively with those of the Project.
- Mitigation measures are proposed, to manage the potential for cumulative impacts, should such events occur at the same time as the Project activities.

23.3 Environmental protection measures

The identified potential impacts and mitigation measures outlined in the EIS inform the environmental protection and management actions contained in the Project EMP and the Dredging EMP. These documents contain the mechanisms for implementation of the Project EIS commitments which aim to ensure the potential environmental impacts of the Project are avoided, mitigated and/or offset.

The Project EMP and Dredging EMP will operate within the framework provided by the existing GPC EMS, which is an overarching framework for managing environmental risk at all GPC managed sites.

23.4 Conclusion

With the effective implementation of the Dredging EMP, Project EMP and Environmental Monitoring Procedure (refer AEIS Appendices F to H) within the framework of the GPC EMS, the Project EIS and AIES have concluded that the majority of environmental impacts from Project activities fall within the significance range of low to moderate and are acceptable in the context of:

- A Port infrastructure project to be carried out within Port limits with the objective of improving operational and economic efficiency of the Port and reducing vessel incident risk
- A Port infrastructure project that aligns with national, State and regional policies regarding sustainable growth of priority ports, including the National Ports Strategy, Ports Act and the Master Plan for the priority Port of Gladstone 2018 in response to Reef 2050.

With the effective implementation of the Project EMP and the Dredging EMP within the framework of the GPC EMS, the EIS for the Project has concluded that the majority of environmental impacts from Project activities fall within the significance range of low to moderate and are acceptable in the context of a Port infrastructure project to be carried out within Port limits with the objective of improving operational and economic efficiency of the Port and reducing vessel incident risk.

The Project is consistent with the objectives of the EPBC Act, including maintaining the protection of MNES. The Project aligns with the core objectives and the guiding principles of Ecologically Sustainable Development and aligns with national, State and regional policies regarding sustainable growth of priority ports, including the National Ports Strategy, Ports Act and priority port planning in response to Reef 2050, and the Port Strategic Plan.

The Project is also consistent with the objectives of the GBRMP Act with no Project activities proposed within the Great Barrier Reef Marine Park (GBRMP) and the indirect impacts of the Project having a low residual impact risk on the GBRMP.

The Project EIS and AEIS significant residual adverse impact assessments have concluded that the establishment of the WBE reclamation area and dredging activities will result in a significant residual adverse impact on:

- Migratory shorebird foraging habitat, including for threatened migratory shorebirds (loss of 479.30ha) (MNES and MSES)
- Seagrass meadows and macroalgae (loss of 374.64ha at WBE reclamation area and loss of 85.33ha at the area to be dredged) (MSES)
- HES wetlands (loss of 73.61ha) (MSES)

- Green turtle foraging habitat (loss of 374.64ha at WBE reclamation area and loss of 35.65ha at the channel duplication area to be dredged) (MSES)
- Dugong foraging habitat (loss of 374.64ha at WBE reclamation area and loss of 35.65ha at the channel duplication area to be dredged) (MSES)
- Beach stone curlew (resident shorebird) foraging habitat (loss of 479.30ha) (MSES).

The Channel Duplication Project Draft Offset Strategy has been developed as part of this AEIS to mitigate the above significant residual adverse impacts on ecological values (refer AEIS Appendix E4).