

PORT OF AIRLIE MARINA DEVELOPMENT

# 19. Cumulative Impacts

## 19.1 Ecologically Sustainable Development

The proposal was assessed against the principles, elements and objectives of the National Strategy for Ecologically Sustainable Development’ (1992). This assessment is provided in **Table 19-1**.

■ **Table 19-1 ESD Assessment**

Principle	Response
<input type="checkbox"/> incorporating ESD in decision-making	The Supplementary EIS sets out the economic, social and environmental costs and benefits of the proposed marina such that decision makers may be properly informed of the full range of costs and benefits of the proposal.
<input type="checkbox"/> the precautionary principle	Risks associated with the proposal are well understood and management measures proposed to manage these risks to appropriate standards.

ESD Element	Response
<input type="checkbox"/> integrating the economic, social and environmental concerns and needs of the community	This Supplementary EIS assesses economic, social and environmental issues associated with the proposed Port of Airlie Marina. It also takes into consideration needs of the local and regional community. While it is inadvisable to directly compare economic, social and community benefits with environmental costs, it would seem that the environmental costs of the proposal are low while the benefits to the local, regional and state economy and local and regional community are significant.
<input type="checkbox"/> accounting properly for the economic costs of environmental degradation	The area that the marina will be located in provides habitat for a number of species of economic significance, including commercial fish and species that attract tourists to the area. It is acknowledged that there will be a small effect on these species, however, in comparison to habitats provided throughout the Whitsunday area, disturbance habitat by the proposal is unlikely to have any significant affect on the viability of these species.  With appropriate environmental management controls as outlined in the Supplementary EIS and EMPs, the project is not expected to create any environmental damage that will result in significant financial losses to the proponent, the community or Government.
<input type="checkbox"/> accepting that each generation is responsible for the welfare of future generations	The proposed marina does not result in any reduction in welfare of future generations.
<input type="checkbox"/> understanding environmental risk and uncertainty	Environmental impacts of the proposal are well understood, both from study of the existing environment and information on impacts of similar proposals. Risk of unacceptable environmental impacts is considered low, provided that environmental management requirements outlined in this Supplementary EIS and EMPs are implemented.
<input type="checkbox"/> understanding the global scale of environmental issues	It is recognised that the proposed marina is located on the edge of the Great Barrier Reef World Heritage Area. However, with appropriate management, the proposal is not expected to have any significant adverse effects on the World Heritage Area (see also <b>Section 19.3</b> ). An area of less than 1 hectare of sparse seagrass and subtidal mudflats will be lost due to the breakwater construction. The proposal will not result in any indirect impacts remote to the site provide that environmental management recommendations made in this Supplementary EIS are implemented. Compensation for marine habitat loss will be provided to relevant government agencies by the Proponent, probably in the form of funding of research.

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Objectives of ESD	Response
<input type="checkbox"/> to enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations	<p>The proposed Port of Airlie will provide significant economic and lifestyle benefits to the local and regional community. Airlie Beach, Cannonvale and Jubilee Pocket communities are strongly dependent on tourism as the main source of economic activity in the area and future economic growth and development in the area requires facilities such as Port of Airlie which support tourism and attract visitors and investment. The project offers significant opportunities for youth of the region to gain training and employment in the region rather than travelling to major towns and cities.</p> <p>The proposed Port of Airlie development is compatible with and complementary to the current nature and level of urban development in Airlie Beach.</p> <p>The proposal is not expected to result in any costs that will need to be borne by future generations or cause any reduction in the welfare of future generations.</p>
<input type="checkbox"/> to provide for equity within and between generations	<p>While the proposal results in loss of 17ha of marine and intertidal habitat, this is replaced by a development which adds value to the community, and therefore, the loss of habitat is not considered to disadvantage future generations when compared to the opportunities that will be created by the proposed development.</p>
<input type="checkbox"/> to protect biological diversity and maintain essential ecological processes and life support systems	<p>Up to 16ha of habitat for wader birds, Dugong, turtles, fish and crustaceans will be lost or modified as a result of the proposal. While these species have conservation significance, the area and quality of habitat to be lost is not considered likely to diminish the abundance or health of these species in the Whitsunday region. Similarly, the project is not expected to detract from any essential ecological processes and life support systems.</p> <p>Provided that management measures identified in the Supplementary EIS and EMPs are implemented, the proposed marina is not expected to lead to any reduction in biodiversity, or have any detrimental effects on ecological processes or life support systems.</p> <p>Compensation for marine habitat loss will be provided to relevant government agencies by the Proponent, probably in the form of funding of research.</p>

## 19.2 Cumulative Impacts

Actual impacts on the natural and physical environment can be summarised as follows:

- Loss of about 1 hectare of mangroves fringing Shute Harbour Road, representing <0.1% of the total coastal mangroves in the Whitsunday coastal region
- Loss of up to 8 hectares of seagrass representing about 2% of the total seagrasses along the Whitsunday Coast and less than 1% of the seagrasses in the total Whitsunday region (note that survey was conducted when conditions for seagrass were ideal and the quality and quantity of seagrass in Boathaven Bay is not always so good)
- Loss of about 8 hectares of mudflat (non-seagrass) from in the Whitsunday Region
- Some short term (1-2 months) increases in turbidity, largely due to channel dredging.

Following assessments made in this Supplementary EIS and also the 1998 IAS (Burchill 1998), the following components of the natural and physical environment will not be affected:

- The reduction in habitat for dugong and turtle will not lead to a reduction in numbers of these species
- Hydrodynamic processes in Boathaven Bay and Campbells Creek estuary should not be affected and thus indirect effects on mangroves and other species not directly disturbed by the project are expected to be minimal

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- ❑ The reduction in intertidal mudflats is minimal in terms of overall area of intertidal mudflats available in the region and is unlikely to have any significant impacts on migratory birds protected under JAMBA and CAMBA or other species dependent on intertidal mudflats.
- ❑ Modelling of dredge plume dispersal indicates that the plume is not expected to impact on mangroves, turbid corals or other ecological communities in Boathaven Bay or Pioneer Bay.
- ❑ Potential water quality impacts associated with activities other than channel dredging can be readily managed to avoid any significant and long-lasting impact.
- ❑ The facility can be operated to avoid any adverse impacts on the surrounding environment.
- ❑ The planned upgrades to the Cannonvale Sewage Treatment Plant will mean that sewage from the Port of Airlie can be treated and disposed of in accordance with requirements of GBRMPA and EPA.

The above assessments took pressures from existing development on the habitat and ecology of Boathaven Bay into consideration. A key pressure on the Bay is the discharge from the Jubilee Pocket Sewage Treatment Plant. Council intends to upgrade or close this plant within the next 8 to 10 years, thus removing the impact of nutrients in discharges from the plant. The effects of stormwater runoff on Boathaven Bay will not be exacerbated and may even be improved by the use of trash racks and sediment tanks to treat stormwater from the eastern part of Airlie Beach as well as much of the development. Stormwater from areas south of the development will be collected and drained into a tidal drain which will incorporate retained mangroves. This may also improve stormwater water quality as mangroves may filter out sediment in stormwater.

Finally, the provision of a controlled environment for boat berthing and repairs may result in some reduction of impacts of these activities including:

- ❑ A controlled environment for boat repairs, rather than scraping and repainting taking place on mudflats and beaches at low tide, as often occurs at present
- ❑ Sewage pump out facilities. This will enhance the enforcement of the planned ban on sewage discharges from boats within one kilometer of the coast and may be a particular benefit in the Pioneer Bay area if live aboard boats on moorings in Pioneer Bay relocate to the marina or install holding tanks.
- ❑ The opportunity to remove some of the moorings in Pioneer Bay. These moorings are likely to be disturbing benthic habitat and probably seagrass habitat in shallower locations.

While it must be acknowledged that there will be some loss of habitat, the overall scale of impact is relatively minor and is largely confined to Boathaven Bay. This is further offset when considering the overall area of each of these habitats that is protected within the Great Barrier Reef Marine Park in a pristine condition, compared to the habitat of Boathaven Bay which, while acknowledged to have ecological value, has been somewhat modified by human activities.

The Great Barrier Reef and Whitsunday Islands are an important ecological resource. In addition, they provide passive and active recreational opportunities for visitors to the region and this in turn provides the basis for a vibrant local economy at locations such as Airlie Beach. The Port of Airlie development will enhance enjoyment of the

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area by visitors as well as providing impetus to the local, regional and state economies without any significant impacts on the ecological resource.

The location of the Port of Airlie is consistent with the direction of the Whitsunday Shire Council strategic plan which recognises the need to identify zones in which development will be allowed, as well as zones which are to be protected for ecological values. It is appropriate to locate a development such as Port of Airlie in an area of concentrated development, so that the vast majority of the Whitsunday region is left in a pristine and undeveloped condition. The Great Barrier Reef Marine Park Authority also recognises this principle in zoning of the Marine Park.

While Port of Airlie is not expected to have any significant impact on the natural and physical environment, future development of Airlie Beach and adjacent localities of Jubilee Pocket, Cannonvale and Mandalay Point will continue to expand. However, the available land in this area is limited by the Conway National Park to landward and the Great Barrier Reef Marine Park to seaward. With the exception of development precincts such as Airlie Beach, the Marine Park boundary typically extends to low water, thus precluding developments similar to Port of Airlie in areas that are not already developed. Hence, there will always be a limit to coastal development in the area. Any proposed developments similar to Port of Airlie will require impact assessment.

**19.3 Compatibility with World Heritage Values**

Overall, the project has minimal direct impacts on the World Heritage Area, with disturbance of a small area of intertidal mudflat and seagrass where the project extends into the World Heritage Area. Some indirect impacts may occur during construction and maintenance dredging, however these can be managed to avoid any long-lasting effects. Overall, while it cannot be claimed that the project will have no adverse impacts on the World Heritage Area, it is likely that these adverse impacts are very low.

A more detailed assessment of impacts on the World Heritage Area is made against the natural criteria against which the Great Barrier Reef was inscribed on the World Heritage List in 1981.

GBRWHA Values	Response
<p><b>Criterion (i) an outstanding example representing a major stage of the earth's evolutionary history.</b>                      The Great Barrier Reef is by far the largest single collection of coral reefs in the world. The World Heritage values of the property include:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 2904 coral reefs covering approximately 20 055km<sup>2</sup>;</li> <li><input type="checkbox"/> 300 coral cays and 600 continental islands;</li> <li><input type="checkbox"/> reef morphologies reflecting historical and on-going geomorphic and oceanographic processes;</li> <li><input type="checkbox"/> processes of geological evolution linking islands, cays, reefs and changing sea levels, together with sand barriers, deltaic and associated sand dunes;</li> <li><input type="checkbox"/> record of sea level changes and the complete history of the reef's evolution are recorded in the reef structure;</li> <li><input type="checkbox"/> record of climate history, environmental conditions and processes extending back over several hundred years within old massive corals;</li> <li><input type="checkbox"/> formations such as serpentine rocks of South Percy island, intact and active dune systems, undisturbed tidal sediments and "blue holes"; and</li> <li><input type="checkbox"/> record of sea level changes reflected in distribution of continental island flora and fauna.</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> The proposed marina development will not impact on any features of geological or geomorphological significance.</li> <li><input type="checkbox"/> The proposed marine will not diminish the historical geological or climatological record of the World Heritage Area.</li> </ul>

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GBRWHA Values	Response
<p><b>Criterion (ii) an outstanding example representing significant ongoing geological processes, biological evolution and man’s interaction with his natural environment.</b></p> <p>Biologically the Great Barrier Reef supports the most diverse ecosystem known to man and its enormous diversity is thought to reflect the maturity of an ecosystem, which has evolved over millions of years on the northeast Continental Shelf of Australia. The World Heritage values include:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> the heterogeneity and interconnectivity of the reef assemblage;</li> <li><input type="checkbox"/> size and morphological diversity (elevation ranging from the sea bed to 1142m at Mt. Bowen and a large cross-shelf extent encompass the fullest possible representation of marine environmental processes);</li> <li><input type="checkbox"/> on going processes of accretion and erosion of coral reefs, sand banks and coral cays, erosion and deposition processes along the coastline, river deltas and estuaries and continental islands;</li> <li><input type="checkbox"/> extensive <i>Halimeda</i> beds representing active calcification and sediment accretion for over 10 000 years;</li> <li><input type="checkbox"/> evidence of the dispersion and evolution of hard corals and associated flora and fauna from the “Indo-West Pacific centre of diversity” along the north-south extent of the reef;</li> <li><input type="checkbox"/> inter-connections with the Wet Tropics via the coastal interface and Lord Howe Island via the East Australia current;</li> <li><input type="checkbox"/> indigenous temperate species derived from tropical species;</li> <li><input type="checkbox"/> living coral colonies (including some of the world’s oldest);</li> <li><input type="checkbox"/> inshore coral communities of southern reefs;</li> <li><input type="checkbox"/> five floristic regions identified for continental islands and two for coral cays;</li> <li><input type="checkbox"/> the diversity of flora and fauna, including: <ul style="list-style-type: none"> <li><input type="checkbox"/> Macroalgae (estimated 400-500 species);</li> <li><input type="checkbox"/> Porifera (estimated 1500 species, some endemic, mostly undescribed);</li> <li><input type="checkbox"/> Cnidaria: Corals – part of the global centre of coral diversity and including: <ul style="list-style-type: none"> <li>• hexacorals (70 genera and 350 species, including 10 endemic species);</li> <li>• octocorals (80 genera, number of species not yet estimated);</li> </ul> </li> <li><input type="checkbox"/> Tunicata: Ascidians (at least 330 species);</li> <li><input type="checkbox"/> Bryozoa (an estimated 300-500 species, many undescribed);</li> <li><input type="checkbox"/> Crustacea (at least 1330 species from 3 subclasses);</li> <li><input type="checkbox"/> Worms: <ul style="list-style-type: none"> <li>• Polychaetes (estimated 500 species);</li> <li>• Platyhelminthes: include free-living Tubellaria (number of species not yet estimated), polyclad Tubellaria (up to 300 species) and parasitic helminthes (estimated 1000’s of species, most undescribed);</li> </ul> </li> </ul> </li> <li><input type="checkbox"/> Phytoplankton (a diverse group existing in two broad communities);</li> <li><input type="checkbox"/> Mollusca (between 5000-8000 species);</li> <li><input type="checkbox"/> Echinodermata (estimated 800 extant species, including many rare taxa and type specimens);</li> <li><input type="checkbox"/> fishes (between 1200 and 2000 species from 130 families, with high species diversity and heterogeneity; includes the Whale Shark <i>Rhynchodon typus</i>);</li> <li><input type="checkbox"/> seabirds (between 1.4 and 1.7 million seabirds breeding on islands);</li> <li><input type="checkbox"/> marine reptiles (including 6 sea turtle species, 17 sea snake species, and 1 species of crocodile);</li> <li><input type="checkbox"/> marine mammals (including 1 species of dugong (<i>Dugong dugon</i>), and 26 species of whales and dolphins);</li> <li><input type="checkbox"/> terrestrial flora: see “Habitats: Islands” and;</li> <li><input type="checkbox"/> terrestrial fauna, including: <ul style="list-style-type: none"> <li>• invertebrates (pseudoscorpions, mites, ticks, spiders, centipedes, isopods, phalangids, millipedes, collembolans and 109 families of insects from 20 orders, and large over-wintering aggregations of butterflies); and</li> <li>• vertebrates (including seabirds (see above), reptiles: crocodiles and turtles, 9 snakes and 31 lizards, mammals);</li> </ul> </li> <li><input type="checkbox"/> the integrity of the inter-connections between reef and island networks in terms of dispersion, recruitment, and the subsequent gene flow of many taxa;</li> <li><input type="checkbox"/> processes of dispersal, colonisation and establishment of plant communities within the context of island biogeography (e.g. dispersal of seeds by air, sea and vectors such as birds are examples of dispersion, colonisation and succession);</li> <li><input type="checkbox"/> the isolation of certain island populations (e.g. recent speciation evident in two subspecies of the butterfly <i>Tirumala hamata</i> and the evolution of</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> The proposed marina will result in loss of 1.2 ha of mangroves and 8 ha of seagrass from Boathaven Bay. Of this, less than 1ha of seagrass is within the WHA. The loss of this area of seagrass is not expected to place any limitations on the range and abundance of species such as dugong and turtles which depend on seagrass habitat. This conclusion is based on there being no evidence of overgrazing of seagrasses in the immediate vicinity of the project (Pioneer Bay). While mangroves affected are outside the WHA boundary, the loss of these slightly diminishes the availability of mangrove habitat for fish dependent on this habitat. It should be noted that the mangroves to be removed have been affected by anthropogenic influences.</li> <li><input type="checkbox"/> The amount of intertidal habitat for seabirds will be reduced by 8 ha. Given the proximity of this habitat to human settlement this loss is not considered significant. None of the intertidal habitat to be lost is within the WHA but it is immediately adjacent top the boundary.</li> <li><input type="checkbox"/> The proposed marina will have no impact on corals and other associated species not mentioned above.</li> <li><input type="checkbox"/> The proposed marina will not impact on any indigenous terrestrial species</li> <li><input type="checkbox"/> The proposed marina will not impact on integrity of ecosystems or ecological processes or interconnections.</li> <li><input type="checkbox"/> The cumulative impacts associated with the proposed marina are limited to the urban area of Cannonvale-Airlie Beach-Jubilee Pocket which has already been disturbed by residential and tourism development. Further development in this area will be limited by the boundary of the WHA and GBRMP on the seaward side and the Conway National Park on the landward side. The Cannonvale-Airlie Beach-Jubilee Pocket are has been identified at the local and regional level as a focus for tourism development in the Whitsundays.</li> </ul>

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GBRWHA Values	Response
<p>distinct races of the bird <i>Zosterops spp</i>);</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> remnant vegetation types (hoop pines) and relic species (sponges) on islands.</li> <li><input type="checkbox"/> evidence of morphological and genetic changes in mangrove and seagrass flora across regional scales; and</li> <li><input type="checkbox"/> feeding and/or breeding grounds for international migratory seabirds, cetaceans and sea turtles.</li> </ul>	
<p><b>Criterion (iii) contain unique, rare and superlative natural phenomena, formations and features and areas of exceptional natural beauty.</b></p> <p>The Great Barrier Reef provides some of the most spectacular scenery on earth and is of exceptional natural beauty. The World Heritage values include:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> the vast extent of the reef and island systems which produces an unparalleled aerial vista;</li> <li><input type="checkbox"/> islands ranging from towering forested continental islands complete with freshwater streams, to small coral cays with rainforest and unvegetated sand cays;</li> <li><input type="checkbox"/> coastal and adjacent islands with mangrove systems of exceptional beauty;</li> <li><input type="checkbox"/> the rich variety of landscapes and seascapes including rugged mountains with dense and diverse vegetation and adjacent fringing reefs;</li> <li><input type="checkbox"/> the abundance and diversity of shape, size and colour of marine fauna and flora in the coral reefs;</li> <li><input type="checkbox"/> spectacular breeding colonies of seabirds and great aggregations of over-wintering butterflies; and</li> <li><input type="checkbox"/> migrating whales, dolphins, dugong, whale sharks, sea turtles, seabirds and concentrations of large fish.</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> The proposed marina will not affect views within or from the WHA as it is located adjacent to a coastal landscape that has already been extensively modified by buildings and other development.</li> </ul>
<p><b>Criterion (iv) provide habitats where populations of rare and endangered species of plants and animals still survive.</b></p> <p>The Great Barrier Reef contains many outstanding examples of important and significant natural habitats for <i>in situ</i> conservation of species of conservation significance, particularly resulting from the latitudinal and cross-shelf completeness of the region.</p> <p>The World Heritage values include:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> habitats for species of conservation significance within the 77 broadscale bioregional associations that have been identified for the property and which include:</li> <li><input type="checkbox"/> over 2900 coral reefs (covering 20 055km<sup>2</sup>) which are structurally and ecologically complex;</li> <li><input type="checkbox"/> large numbers of islands, including: <ul style="list-style-type: none"> <li>• 600 continental islands supporting 2195 plant species in 5 distinct floristic regions;</li> <li>• 300 coral cays and sand cays;</li> <li>• seabird and sea turtle rookeries, including breeding populations of green sea turtles and Hawksbill turtles; and</li> <li>• coral cays with 300-350 plant species in 2 distinct floristic regions;</li> </ul> </li> <li><input type="checkbox"/> seagrass beds (over 5000km<sup>2</sup>) comprising 15 species, 2 endemic;</li> <li><input type="checkbox"/> mangroves (over 2070km<sup>2</sup>) including 37 species;</li> <li><input type="checkbox"/> <i>Halimeda</i> banks in the northern region and the unique deep water bed in the central region; and</li> <li><input type="checkbox"/> large areas of ecologically complex inter-reefal and lagoonal benthos; and</li> <li><input type="checkbox"/> species of plants and animals of conservation significance.</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> The proposed marina will result in loss of 1.2 ha of mangroves and 8 ha of seagrass from Boathaven Bay. Of this, about 1 ha of seagrass is within the WHA. The loss of this area of seagrass is not expected to place any limitations on the range and abundance of species such as dugong and turtles which depend on seagrass habitat. This conclusion is based on there being no evidence of overgrazing of seagrasses in the immediate vicinity of the project (Pioneer Bay). While mangroves affected are outside the WHA boundary, the loss of these slightly diminishes the availability of mangrove habitat for fish dependent on this habitat. It should be noted that the mangroves to be removed have been affected by anthropogenic influences.</li> <li><input type="checkbox"/> The amount of intertidal habitat for seabirds will be reduced by 8 ha. Given the proximity of this habitat to human settlement this loss is not considered significant. None of the intertidal habitat to be lost is within the WHA but it is immediately adjacent to the boundary.</li> <li><input type="checkbox"/> No other species or habitats of conservation significance are expected to be affected by this development.</li> </ul>