

Figure 5.3 Ground-truthed regional ecosystems

Key Issues

The proposed project may involve the removal of remnant native vegetation and will potentially impact on ecosystems in the site. Where possible, habitats of conservation significance will be avoided through facility layout design. Habitat/vegetation offsets will be provided for unavoidable impacts on native vegetation.

Koalas (*Phascolarctos cinereus*), which are listed as 'low risk – near threatened' under the IUCN Red List of Threatened Species and 'vulnerable' under the Nature Conservation Act are likely to be associated with the forest red gum woodlands and open forest vegetation described above. Further more detailed flora and fauna surveys will be undertaken as part of the EIS.

5.4 Marine Ecology

The waters surrounding Curtis Island and the land itself are listed as part of the Great Barrier Reef World Heritage Area, although the Great Barrier Reef Marine Park does not extend into Port Curtis, nor the area of project investigation. The Great Barrier Reef is of great scientific interest as habitat for the dugong (sea cow), listed as 'vulnerable' under the *IUCN Red List of Threatened Species* and the large green turtle, listed as 'threatened' under the *IUCN Red List of Threatened Species*. Both species are listed as 'vulnerable' under the Nature Conservation Act.

Seagrass beds in the region occur in intertidal, subtidal and deep water zones and largely comprise *Zostera capricornia* communities with *Halophila ovalis* and *Halodule uninervis* also commonly observed (Rasheed et al., 2008). Large aggregated patches of seagrass occur in the shallow waters of the Queensland coast extending from the mouth of Calliope River to Friend Point (Figure 5.4). The southwestern coastal region of Curtis and Quoin Islands is comprised of continuous seagrass cover with small unvegetated areas (Figure 5.5). Seagrass communities are of ecological significance as nursery habitats for many marine species including turtles, dugongs, fish and invertebrates. For the past two years, the Queensland Department of Primary Industries and Fisheries Marine Ecology Group in collaboration with Central Queensland Ports Authority have regularly monitored seagrass communities of the Port Curtis region.

All species of marine turtles occurring in Australian waters are protected under the EPBC Act. There is a major nesting site (25 to 50 individuals per year) for the flatback turtle (*Nator depressus*) on the ocean beaches of Facing Island and southern Curtis Island (located approximately 10 km east of the proposed LNG site) (Limpus et al., 2006). Green turtles (*Chelonia mydas*) are also known to occasionally nest in the area. Loggerhead (*Caretta caretta*) and hawksbill (*Eretmochelys imbricata*) turtles have also been recorded in the area.

Nationally significant coastal wetlands exist close to or within the project area. The complex structure of the wetlands is important for many ecological processes. They provide nursery habitat for many juvenile fish species and marine invertebrates and behave as buffers of sedimentation and strong weather, and act as a natural nutrient filtration system, which is important in Port Curtis due to high flows within the system. The intertidal mangrove communities are dominated by the red mangrove, *Rhizophora stylosa* (Danaher, 2005).

Coastal vegetation likely to be impacted by the proposed development may provide essential habitat for the beach stone-curlew (*Esacus neglectus*), listed as 'vulnerable' under the Nature Conservation Act. A number of other birds listed under international migratory agreements (such as JAMBA and CAMBA) occur throughout the area, including Radjah shelduck (*Tadorna radjah*),

chestnut teal (*Anas castanea*), little tern (*Sterna albifrons*), sooty oystercatcher (*Haematopus fuliginosus*) and black-necked stork (*Ephippiorhynchus asiaticus*).

Key Issues

Seagrass beds and mangroves may be removed or buried for construction of supporting marine infrastructure, channel deepening and spoil disposal. Adjacent areas may be affected by increased sedimentation, which can lead to smothering of seafloor habitat and reduced light availability within the water column. Loss of seagrass beds may impact marine fauna, such as dugongs and green turtles that rely on these habitats for survival. Port Curtis is listed as a Dugong Protection Area under the Great Barrier Reef Marine Park Zoning Plan 2003. Monitoring of the seagrass beds in the Port Curtis area, in particular Wiggins Island, has indicated that these are important resources for dugong populations with evidence of feeding trails in the meadows (Storey et al., 2007).

Underwater noise and lighting effects associated with the project may have an impact on the movement and migration of marine fauna passing through local waterways. These issues are discussed in sections 5.9 and 5.10 respectively.

A potential pathway for the introduction of non-native marine flora and fauna and organisms into Australian waters is from ballast water discharged in waters of Port Curtis or from non-native organisms attached to the hulls of the construction vessels, LNG carriers and condensate tankers. Marine pests cause problems to ecosystems through competition with existing native species for resources, alteration of localised gene pools and modification of physical environments. The project will comply with the International Convention for the Prevention of Pollution from Ships (MARPOL) (IMO, 1973/1978) and Australian Quarantine and Inspection Service's Australian Ballast Water Management Requirements Version 4.

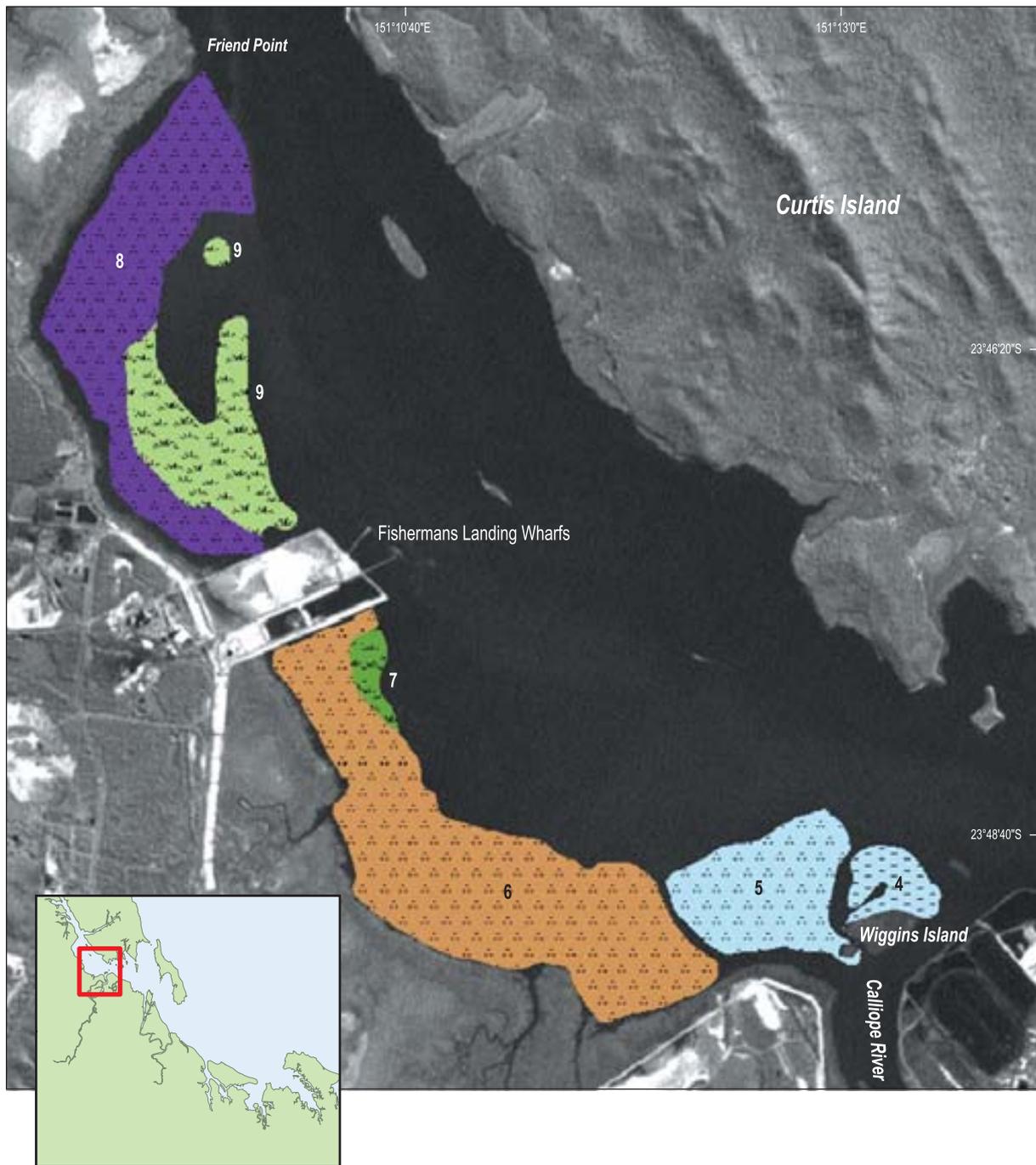
Potential impacts to marine fauna and flora species and appropriate mitigation measures would be investigated as part of the EIS. Shell will work closely with Gladstone Ports Corporation in understanding and mitigating impacts from dredging and disposal of dredged material.

5.5 Surface Water Hydrology

Surface water hydrology on Curtis Island is characterised by small ephemeral streams that drain to intertidal mudflats and coastal wetlands. Dams have been established on drainage lines to provide water for livestock.

Water supply options for the proposed LNG facility will be evaluated. Potential sources include municipal supply (the main water supply for the region is currently from Lake Awoonga, situated approximately 25 km south of Gladstone), groundwater (if sufficient quantities are available), and seawater (which would be treated by a reverse-osmosis desalination unit).

Wastewater is expected to be discharged to Port Curtis in accordance with applicable quality standards, where strong currents and high tidal velocities are expected to effectively disperse plumes.



Legend

Community type

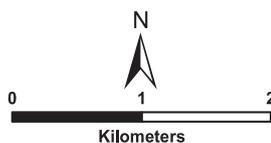
- Light *Z. capricorni* with *H. ovalis*
- Light *Z. capricorni* with mixed *Halophila* species
- Moderate *H. ovalis* / *Z. capricorni*
- Moderate *H. decipiens*
- Moderate *H. decipiens* with mixed species

* This is not a complete seagrass distribution, only selected seagrass monitoring meadows displayed

Background: Landsat ETM + Panchromatic 24 July 1994

Meadow Cover

- Aggregated Patches
- Continuous Cover
- Isolated Patches



Source: Rasheed, M.A., McKenna, S.A., Taylor, H.A and Sankey, T. 2008. Long term seagrass monitoring in Port Curtis and Rodds Bay, Gladstone - October 2007. DPI&F Publication PR07-3271 (DPI&F, Cairns) 32p.

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Produced by the Marine Ecology Group, Queensland Department of Primary Industries and Fisheries, Northern Fisheries Centre, Cairns, 2008.



Figure 5.4

Seagrass distribution of the Fisherman's Landing region, 2007.

(Source: Rasheed, M.A., McKenna, S.A., Taylor, H.A. and Sankey, T.L. 2008. Long term seagrass monitoring in Port Curtis and Rodds Bay, Gladstone - November 2007. Queensland Department of Primary Industries and Fisheries (DPI&F) Publication PR07-3271. DPI&F, Cairns. 32 pp.)



Legend

Community type

- Light *H. uninervis* (wide) with mixed species
- Light *Z. capricorni*
- Light *Z. capricorni* with *H. ovalis*

Meadow cover

- Aggregated Patches
- Continuous Cover
- Isolated Patches

* This is not a complete seagrass distribution, only selected seagrass monitoring meadows displayed



Source: Rasheed, M.A., McKenna, S.A., Taylor, H.A. and Sankey, T. 2008. Long term seagrass monitoring in Port Curtis and Rodds Bay, Gladstone - October 2007. DPI&F Publication PR07-3271 (DPI&F, Cairns) 39p.

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Background: Landsat ETM + Panchromatic 24 July 1994

Figure 5.5

Seagrass distribution of the Quoin Island and South Trees region, 2007.

(Source: Rasheed, M.A., McKenna, S.A., Taylor, H.A. and Sankey, T.L. 2008. Long term seagrass monitoring in Port Curtis and Rodds Bay, Gladstone - November 2007. Queensland Department of Primary Industries and Fisheries (DPI&F) Publication PR07-3271. DPI&F, Cairns. 32 pp.)