The Coordinator-General

Gold Coast International Marine Precinct:

Coordinator-General's evaluation report on the environmental impact statement

December 2013

Amended August 2014

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Synopsis

This report evaluates the potential impacts of the Gold Coast International Marine Precinct (GCIMP) project (the project). It has been prepared pursuant to section 35 of the *State Development and Public Works Organisation Act 1971* (Qld) (SDPWO Act).

Harbour Island Pty Ltd (the proponent) proposes to develop an integrated mixed-use marine industry facility on the Coomera River, 20 kilometres (km) north of Surfers Paradise. This development would expand upon the existing marine precinct south of the proposed development site and has been designed to accommodate production facilities, suppliers and service industries to support the growth of the marine industry.

The development is proposed on approximately 63.5 hectares (ha) of land. Approximately 42 ha of the site would be developed for marine industry and mixed-use (e.g. display and showrooms, corporate office space, small scale light industry and restaurants and retail outlets). The proponent's preferred master plan for the site includes 11.5 ha for an internal and external marina facility and a 2.2 ha dredge material disposal area.

An area of 4.9 ha along the northern and western boundary of the proposed development would be retained to conserve the existing natural values along Oakey Creek.

Flooding

The site is low lying, flood affected and partially inundated by high tidal conditions. Approximately 65 per cent of the site would be filled to a level above the 1 per cent annual exceedance probability (AEP) flood level. The proposed partial filling of the site is predicted to have a localised impact on flooding by reducing available flood storage and by reducing the conveyance capacity of Oakey Creek. These impacts are partially offset by the proposed widening and deepening of the channel between the site and Foxwell Island, which would increase the flood conveyance capacity of the Coomera River.

The proposed development could result in minor changes to flood levels in the immediate area with increases typically in the order of 0.01 metre (m). The exception would be upstream from the site on Oakey Creek where flood levels could be expected to increase by up to 0.044 m during the one per cent AEP regional catchment flooding event.

The environmental impact statement (EIS) identified 11 properties that could be affected in events up to the one per cent AEP. The proponent indicated that the increase in the flood level in these areas would be small (10–20 millimetres (mm)) and predicted that the probability of material damage occurring is very low, ranging from 1 in 300 to 1 in 4000 in any given year.

The loss of flood storage capacity of the site is also expected to cause flood velocity increases up to 0.46 m per second in 1 per cent AEP events in the section of Oakey Creek adjacent to the north-western corner of the site. I state conditions in this report to minimise any impacts that the changed velocity may have on the morphology of the

creek. I also state conditions to minimise project-related impacts that could result in alterations to the flow regime and habitat in the area.

Marine water quality

Dredging and dry excavation works are proposed to widen the access channel between the development site and Foxwell Island and for the construction of the external and internal marinas. The marinas would require maintenance dredging approximately every 10 years during operation.

The proponent has committed to implement control measures to manage the dispersion of suspended sediments during the capital and maintenance dredging works. The timing and staging of dredging works would be managed to confine the resulting turbid waters. Silt curtains would be installed to contain the dredge plume generated by these works.

The proponent has committed to implement adaptive management measures, including a risk-based water quality monitoring program, to ensure dredging operations would be responsive to changes in water quality.

Investigations have indicated that the sediments are uncontaminated. Therefore, the risk of mobilising metals and other contaminants during capital works is low.

Stormwater runoff and marina activities would be managed during operations to reduce contamination of sediment in the marinas and prevent the potential dispersion of sediment-associated contaminants during maintenance dredging operations. The marinas have been designed to maintain good water circulation and tidal flushing, thereby reducing stagnation and the build-up of pollutants within the marinas.

Potential acid sulfate soils

As the site is below 5 m Australian Height Datum (AHD), construction activities would be expected to disturb acid sulfate soils. Preliminary soil sampling indicated that acid sulfate soils may be exposed through direct excavation and/or groundwater drawdown. All construction activities are to be undertaken in accordance with an acid sulfate soil management plan to ensure that receiving waterways and groundwater are not affected by acidic material.

Groundwater drawdown management measures including recharge trenches would be implemented along the boundaries of the marina excavation areas to reduce the exposure of acid sulfate soils. All ponded surface waters and groundwater seepage within excavation areas, acid treatment or any water quality control structures would be tested and treated prior to any dewatering activities. No water from dewatering activities is to be released into the recharge trenches or receiving waterways other than waters meeting the performance criteria specified in the acid sulfate soils management plan.

Treatment beds and treated material stockpiles would be contained within bunded containment areas away from areas affected by surface water runoff, to prevent the release of acid leachate to receiving waterways.

Regional dredge material rehandling facility

The project masterplan includes a 2.2 ha dredge material rehandling facility for the future maintenance of the precinct's marina areas.

The EIS presented four options for managing dredge material disposal for both the GCIMP and regional requirements, including future maintenance of navigation channels in the Coomera River. The options included a 9 ha regional dredge material rehandling facility on the western portion of the site. This area would be available for the Gold Coast Waterways Authority (GCWA) and/or Gold Coast City Council (GCCC) to be acquired from the proponent on a commercial basis to establish a regional dredge material rehandling facility (the land is freehold and currently zoned for marine industry development). The proponent would not be responsible for developing the regional dredge material rehandling facility.

I note that the EIS reported the economic benefits from the GCIMP would be reduced, should a regional dredge material rehandling facility be incorporated on the western portion of the development. However, I consider that the overall Coomera marine industry precinct would benefit from such a facility, as it would facilitate more frequent dredging of the Coomera River and improve access for larger vessels.

Buffer to Oakey Creek

The proponent's preferred master plan for the GCIMP proposes a minimum 40 m vegetated setback along Oakey Creek. This land would create a 4.9 ha buffer to protect the environmental values associated with the creek from the impacts of the proposed development.

Weed management and rehabilitation works are proposed for the buffer to provide habitat for flora and fauna.

The EIS provided an assessment of ecological gains that may be achieved by extending the width of the proposed buffer area to 80 m to preserve an additional 4.32 ha of salt marsh. This would provide a minimal ecological benefit to the creek and I note that the proponent has proposed to offset any ecological communities that may be affected during the construction of the proposal.

The EIS concluded that increasing the buffer to 80 m would result in fewer external marina berths, and fewer mixed-use precinct and industrial subdivision components. The proponent considers that this option would make the project financially unviable.

The minimal environmental gains and adverse economic impacts of the 80 m buffer are noted. I consider the 40 m setback an appropriate size to protect the environmental values of the creek. A buffer of this size balances environmental protection while ensuring the economic benefits of the development can be delivered. I state a condition to ensure these outcomes.

Loss of public parkland

The proponent proposes to acquire William Guise Foxwell Park, which is state-owned land dedicated as a park and recreation reserve with GCCC as trustee. The park is adjacent to the proponent's land holdings and represents 170 m of river frontage and 3.7 ha of developable marine industry land.

The park is currently utilised by the Hinterland Model Flying Club and provides access to the Coomera River for recreational fishing. It does not contain recreational or active infrastructure and can be considered underutilised. The proponent was contacted by the President of the Hinterland Model Flying Club during the public notification period for the EIS regarding the progress of the development and the proponent has committed to ongoing engagement with this stakeholder as the project progresses.

The requirement for access to the Coomera River is of primary importance to the functionality of the marine industry, as there are limited places on the Gold Coast where marine industry activities can be established. The EIS noted that the development would potentially become economically unviable without the river frontage provided by the parkland.

While the development would result in the loss of 3.7 ha of public parkland, the proponent proposes to facilitate public access to the area and improve foreshore accessibility through the provision of pedestrian pathways, boardwalks and viewing decks. The pedestrian facilities would also be expected to provide greater access to the foreshore for members of the public with mobility issues. It was also noted in the EIS that the public access area would also provide continued access for recreational fishing. I consider that these public access provisions help compensate for the loss of park land.

On 26 March 2008, GCCC advised in a letter to the former Department of Natural Resources and Water that Council did not object to the application to purchase the reserve for park and recreation. Council's support was conditional on the EIS process considering a regional dredge material rehandling facility being provided on the western portion of the project site. Council has reiterated this position in comments on the TOR and the EIS for this project.

On balance, I consider the economic benefits that would be realised from the development of the GCIMP outweigh the loss of public space. Furthermore, the project has catered for public uses and parkland areas within the development. I recommend that GCCC relinquish trusteeship of William Guise Foxwell Park and for the Department of Natural Resources and Mines to facilitate the transaction, which should occur at market value.

State-controlled road network impacts

The EIS stated that, once complete, the GCIMP would generate around 10 130 daily trips and 1100 peak hour trips on the surrounding road network once fully developed. This volume of traffic would affect the Pacific Motorway and Foxwell Road interchange and the Beattie Road/Service Road intersections that are part of the state-controlled road network.

The Department of Transport and Main Roads (TMR) considers the impacts on the state-controlled road network resulting from the project to be significant, particularly in relation to the operation of the Pacific Motorway/Foxwell Road interchange. TMR advised that the increase in demand on the Pacific Motorway connection has the potential to cause safety and efficiency impacts due to expected queues of stationary or slow-moving vehicles extending into the higher-speed through lanes on the motorway.

The EIS noted that, regardless of the proposed development, the interchange will require upgrading within the next 10 years.

The additional information to the EIS stated that any contribution rate applied to the project should consider the net impact of the proposed development in the context of what could be developed on the site under a self-assessable or code-assessable application under the *Sustainable Planning Act 2009* (SPA). The proponent reports that the level of impact from the proposed development would be similar to that of a development comprising uses currently allowable under the local area plan in GCCC's Planning Scheme. The proponent concluded that a financial contribution to mitigate the impacts of the project is not required.

Based on the advice from TMR, I consider that a financial contribution toward the upgrade of the Pacific Motorway/Foxwell Road interchange is appropriate and should be determined within an infrastructure agreement. Should agreement not be reached the Coordinator-General will make this decision.

It is noted that the traffic generation rates expected from the project would be significantly reduced if the regional dredge material rehandling facility is established on the site. Financial contributions would also be reduced.

Matters of national environmental significance

Wetlands of international importance

The proposed marine precinct is located on the Coomera River, 3.3 km upstream from the Moreton Bay Marine Park, which is also a Ramsar wetland. The EIS investigated potential impacts on the ecological character of the Ramsar site including downstream water quality and marine fauna that potentially use the Coomera River.

Localised water quality impacts could occur as a result of capital and maintenance dredging works and tailwater discharges associated with treatment of material generated by maintenance dredging. Works are expected to generate suspended sediment concentrations and have localised impacts on seagrass.

I state conditions in this report that require the proponent to minimise impacts on water quality associated with bulk earthworks during construction and operational uses. The expected residual impacts could lead to the loss of 1.23 ha of seagrass areas at Foxwell Island and a site 800 m downstream. Whilst these seagrass beds are not located within the boundaries of the Moreton Bay Ramsar site, they could provide potential foraging habitat for dugongs and green turtles, which are considered important to the ecological character of the Ramsar wetland. However, it is unlikely that dugongs and turtles use these areas, given the existing busy nature of the waterway. In accordance with State and Commonwealth policies, the proponent would be required to provide offsets for any loss of seagrass.

Investigations in the EIS, including numerical modelling of plume dispersion in the Coomera River, showed that water quality in the Moreton Bay Ramsar area would be minimally affected by the project.

The proposed development would increase the number of vessels using the Coomera River, which may increase the risk of boat strike to marine megafauna including turtles,

dugongs and dolphins. These species may also be impacted by underwater noise generated by pile driving and dredging activities. The increased risks of boat strike and underwater noise impacts is low because the large number of boats using the river will discourage megafauna from frequenting this part of the Coomera River. Whilst there is a low likelihood of these species occurring, there is still some risk of occurrence given the presence of foraging resources such as seagrass and prey species.

Noise mitigation measures would include commencing pile driving activities with a soft start, using pile driving methods that generate less noise, and the use of dredge equipment that generates a lower level of noise than other dredging equipment. I state conditions in this report requiring the proponent to reduce underwater noise impacts on marine fauna.

I have considered that the proposed development would not have an unacceptable impact on the ecological character of the Moreton Bay Ramsar wetland, provided that measures are implemented to reduce impacts on water quality and marine megafauna.

Threatened species and ecological communities

Only one species of fauna listed as threatened under EPBC Act was identified on the site. This species, the grey-headed flying fox, was recorded feeding on blossoms of a blue gum eucalypt in the western section of the site.

The proposed development would minimise impacts on the grey-headed flying fox by retaining suitable flowering and fruiting tree species in the 40-metre buffer zone and natural vegetation area in the western section of the site. The proponent has committed to rehabilitate and revegetate the area to the west of Shipper Drive and the 40-metre buffer zone. Tree plantings associated with revegetation works in the buffer areas would also include a number of flowering species that would provide foraging habitat for this species.

Habitat for the water mouse, which is listed as vulnerable under the EPBC Act, was identified on the site including areas of mangrove and saltmarsh along Oakey Creek. This species was not identified during field surveys.

Potential impacts to this species would be reduced by retaining habitat within the proposed 40-metre buffer zone from Oakey Creek. Habitat within the buffer zone would also be enhanced through the removal of weeds and implementation of a revegetation program.

During construction, a number of measures would be implemented to reduce injury to the water mouse population during vegetation clearing works. Water mouse habitat would be protected by constructing a retaining wall around the northern and western perimeter of the site to prevent earthwork activities from encroaching on the proposed buffer area. Control measures to reduce impacts on water quality during the construction and operation of the project (such as acid sulfate soils and stormwater management) would be expected to assist in reducing impacts on this species.

Listed migratory species

The EIS reported that six migratory bird species were recorded on the site during field surveys. This included four migratory wetland species and two terrestrial migratory species. The species that were identified include:

- wetland/marine: great egret, cattle egret, sharp-tailed sandpiper, red-necked stint
- terrestrial: rainbow bee-eater, white-bellied sea eagle.

The site is not identified as providing important habitat for any of the identified migratory species. All species of migratory bird were observed in low numbers during surveys and were typically observed in or around the central wetland area.

The central wetland area on the site is identified as providing foraging and roosting habitat for the wetland/marine species and as foraging habitat for the terrestrial species. Surveys did not identify any nest sites for the rainbow bee-eater or the white-bellied sea eagle on the site. However, an active white-bellied sea eagle nest was located on a property immediately north of the site. Clearing activities associated with the proposed development are not expected to impact on the nesting habitat for either terrestrial species.

The removal of 15.45 ha of wetland vegetation from the central area of the site is expected to result in a loss of suitable foraging habitat for the wetland/marine species. The EIS indicated that removing the estuarine intertidal habitat associated with the semi-permanent wetland would limit the continued use of the site by these species and that the intensification of activities associated with the operation of the development would also be expected to discourage these species from using the site.

Given the site's close proximity to important wetland areas to the north and south, the recorded migratory species are considered likely to use the site in transit to these areas. These wetland areas, including the Coombabah–Parklands Conservation Reserve and Pimpama Rivers Conservation Cluster, are protected areas that provide similar wetland communities to those found on the site. The reserves are identified as providing important wetland habitat for a large number of migratory bird species, including the species that were identified on the site. The development site is not considered to be important habitat for migratory shore birds as the site does not support at least 0.1 per cent of the flyway population for any of the identified species, supports less than 15 species, and supports less than 2000 individuals of each species. Consequently, the loss of estuarine wetland habitat from the site is not considered to have an unacceptable impact on the local and regional population of any of these listed migratory wetland species.

I recommend conditions to the Minister for the Environment for approval of the project. These include signage to reduce the impacts of additional marine traffic and litter, and the development of offset plans for impacts on seagrass and mega fauna.

Coordinator-General's conclusion

I consider that the environmental impact assessment requirements of the SDPWO Act for the GCIMP project have been met and that sufficient information has been provided to enable a thorough evaluation of the potential impacts of the project.

I conclude that there are significant local, state and national benefits to be derived from the development and that any adverse environmental impacts can be acceptably avoided, minimised, mitigated or offset through the implementation of the proponent's mitigation measures and commitments outlined in the EIS documentation. My conditions and recommendations have been formulated so that all impacts associated with the project are managed.

Accordingly, I approve the project to proceed subject to the conditions and recommendations set out in the appendices of this report. In addition, it is expected that the proponent's comments will be fully implemented.

This report will be provided to the Commonwealth Minister for the Environment, pursuant to section 36(2) of the State Development and Public Works Organisation Regulation 2010 and the bilateral agreement between the State of Queensland and the Commonwealth to support a decision on the controlled actions for this project, pursuant to section 133 of the EPBC Act.

A copy of this report will also be provided to the proponent, GCCC and relevant state government agencies, and will also be made publicly available at: **www.dsdip.qld.gov.au/GCIMP**

Barry Broe

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Barry Broe
Coordinator-General

19 December 2013

1. Introduction

This report has been prepared pursuant to section 35 of the *State Development and Public Works Organisation Act 1971* (Qld) (SDPWO Act) and provides an evaluation of the environmental impact statement (EIS) for the Gold Coast International Marine Precinct (GCIMP) project (the project).

The report provides an assessment of the key issues associated with the project's potential impacts on the physical, social and economic environment at the local, regional and state levels.

Project information and assessment has been adequate to enable the necessary evaluation of potential environmental impacts, development of mitigation strategies and setting of conditions of approval. The report includes conditions that must be incorporated into subsequent development approvals and licences required to be issued by various state agencies and local government. It also includes recommendations, where appropriate, to assist and guide relevant decision-makers of future assessments and approvals required at the more detailed design phases of the project.

Additional information and investigations will continue to be provided during the detailed design phases of the project and through the further assessments undertaken as part of subsequent state and local government approval processes.

This report represents the conclusion of the Coordinator-General's impact assessment process under the SDPWO Act and the assessment bilateral agreement between the State of Queensland and the Commonwealth. For information on the EIS process, including details of the organisations and individuals who commented on the proponent's EIS, refer to Section 3 of this report (page 12).

2. About the project

2.1. The proponent

The proponent[1] for the project is Harbour Island Pty Ltd (Harbour Island) a joint venture partnership between Maritimo Offshore Pty Ltd (Maritimo) and Property Solutions Group, formed specifically to develop the GCIMP.

Maritimo was founded by Bill Barry-Cotter in 2002 and it is a recognised manufacturer that exports large cruise boats. Bill Barry-Cotter established Riviera Marine in 1980 and has formed an international reputation for manufacturing and exporting high quality luxury cruiser boats, winning both Australian and international awards.

Maritimo contributes significantly to the local marine industry at the Gold Coast, currently operating from two sites, one at the existing Gold Coast Marine Precinct (GCMP), and the other at Hope Island. It directly employs 90 staff and in the 2010–11 financial year, produced 30 vessels and had sales of approximately $25 million.

In 2009, Maritimo acquired Mustang Cruisers and now manufactures these vessels to broaden its depth of products and improve the business's economic sustainability.

In response to the growing demand for marine industry development, Maritimo seeks to expand on land adjacent to the existing GCMP. As the project site owner, Maritimo has been involved throughout the concept design of the project to ensure proposed facilities will meet the needs of the manufacturing process, and that associated service industries would integrate and support the economic activity of the precinct as a whole.

Property Solutions Group specialises in property development and investment and brings expertise in industrial property development, and marina ownership and design to the GCIMP project. The company has developed retail and commercial projects including Centro on James in the Fortitude Valley and the Yatala Enterprise Area. Property Solutions Group collaboratively own and operate Tin Can Bay, Coffs Harbour and Pacific Harbour Marinas.

Maritimo and Propoerty Solutions propose to deliver an integrated industrial marine precinct of an international standard by combining the companies' respective expertise within the joint venture partnership.

2.2. Project description

The GCIMP proposes to establish a high-quality, innovative, and diverse marine industry precinct catering to the core boat building industry, while facilitating other ancillary and associated businesses such as supply chain industries and food outlets for workers and visitors.

The proposed project is located on approximately 64 hectares (ha) of land within the 250-hectare zoned marine industry precinct at Coomera. Approximately 42 ha of the site would be developed for marine industry. This includes dedicating 5 ha of the site to

[1] For a definition of 'proponent', refer to the Glossary on page 189 of this report.

the expansion of the Maritimo production facility currently located at the GCMP and the remainder of the marine industry precinct would include a range of facilities and factory units.

The balance of the site includes a vegetated setback along Oakey Creek and public access facilities, such as show rooms for marine products. A pedestrian zone will also be constructed along the river front, providing a landscaped promenade alongside the marina. A small but vibrant entertainment precinct is proposed to encourage visitation to the site and stimulate economic activity in the precinct.

The proposed project would be developed with four distinct precincts to allow for similar activities to be located together. The precincts would allow for public access to the river foreshore (where safety permits), conservation and rehabilitation of areas with high environmental values, direct access to the Coomera River for vessels, and opportunities for marine industry uses.

2.2.1. Location

The proposed development is located on land at 2, 54 and 110 Shipper Drive, Coomera, within the Gold Coast City Council (GCCC) Local Government Area (LGA). The site is located in the upper catchment of Coomera River and is bound to the north and west by Oakey Creek, to the east by the Coomera River and to the south by Shipper Drive. The site's direct access to the Coomera River has been a key determinate for the location of the GCIMP, as access to similar sites on the Gold Coast is limited.

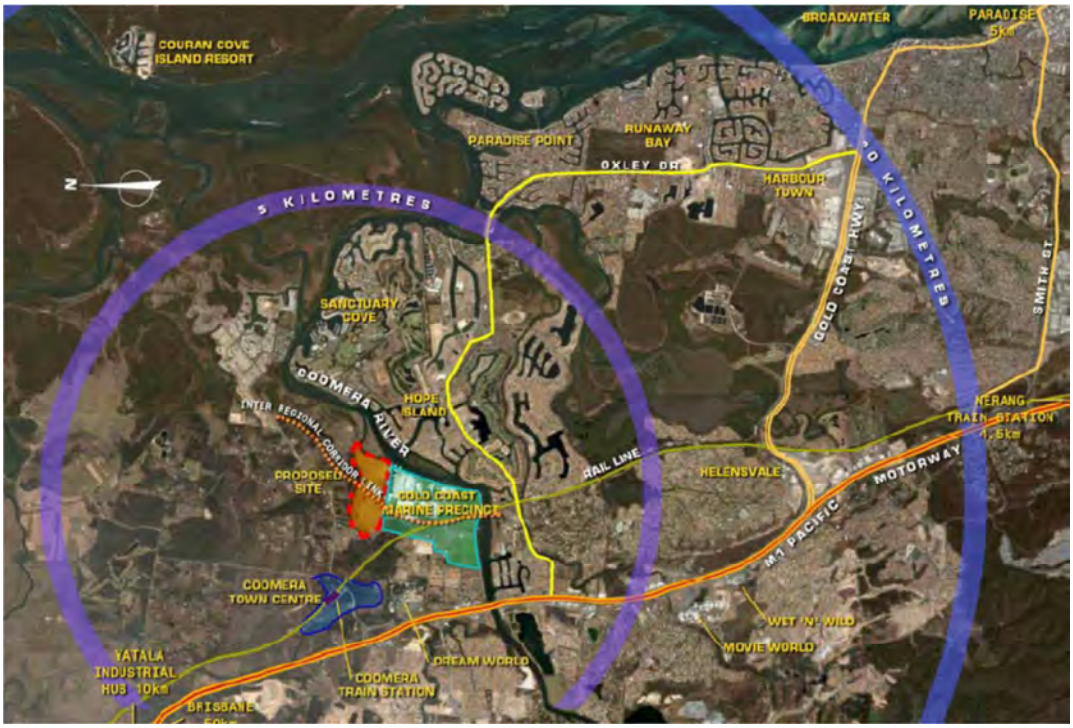

Figure 2.1 Location map

The site is approximately 3 km upstream from the Moreton Bay Marine Park, 7 km from the Southern Broadwater and 9 km west of the Pacific Ocean.

Residential development has been approved to the north of the site across Oakey Creek. To the south of the site is the existing GCMP, incorporating businesses such as Maritimo and Riveria. The Coomera town centre, Coomera train station and Pacific Motorway are located less than 3 km to the west of the site. Immediately to the east of the site is Foxwell Island, a freehold island in the Coomera River, and beyond this is the Hope Island development.

2.2.2. Project components

The project consists of the following key components:

- a 28.9-hectare marine industry zone, inclusive of ship-lift facilities, boat and yacht manufacturers, repairers and associated businesses
- a dry boat stacked storage facility with gantry crane access for approximately 290 vessels
- a 4.5-hectare internal marina incorporating approximately 110 berths, providing a calm water environment for the launch and retrieval of vessels and for the on-water display of vessels by manufacturers and retailers on site
- an external marina within the Coomera River incorporating 264 multiple sized berths
- a 10.9-hectare mixed-use precinct comprising showrooms, display rooms for marine parts, fittings and fixtures, corporate office space, small scale light industry and services such as a yacht club, restaurants and lower order retail outlets.

Inter-Regional Transport Corridor

Lot 35 on SP150730 on the project site contains a reserve for the Department of Transport and Main Roads (TMR) which protects the future Inter-Regional Transport Corridor (IRTC). Running approximately north-east to south-west through the site, the IRTC is being preserved by TMR to provide a possible future connection from Coomera to Nerang. The corridor is also acknowledged as a multi-modal urban arterial in the Gold Coast City Council Transport Strategy 2031 and would be a six-lane road with an overpass to Shipper Drive and a bridge crossing Oakey Creek.

The division of the master plan into marina-related industry in the eastern portion of the site and marine industrial subdivision on the western side is due to the transport corridor bisecting the site.

2.2.3. Development stages

The EIS Appendix 13, Construction Methodology Report and Plans (prepared by Hyder consulting) provide a detailed description of the proposed construction methodology and development stages of the proposal. It is anticipated that the construction of the GCIMP would be undertaken in stages to enable the effective re-use of material such as topsoil, preload and bund materials.

The IRTC corridor, existing site conditions and the required time for preloading the in situ material have been used to determine the development staging. The construction period would consist of two stages including:

- stage 1—the portion of site to the east of the IRTC corridor, with 12 different construction phases
- stage 2—the portion of site to the west of the IRTC Corridor, with six different construction phases.

Construction

The construction milestones relevant to the GCIMP are summarised Table 2.1.

Table 2.1 Summary of construction milestones and activities

Milestone	Activity
Site Establishment	Site compound setup Implementation of erosion and sediment control devices Survey set out No-go zones and construction areas demarcated
Site Preparation	Demolition of existing structures Clearing and grubbing Topsoil stripping Construction of bunding
Earthworks	Wet excavation Dry excavation Pilling Revetment walls Batter protection Fill
Post Earthworks	Preloading designated areas Install piezometers, wick drains Remove preload and bunding
Services	Vacuum sewer Potable and recycled water Gas Communications Electrical
Roadworks	Roads Car parks Hardstands
Other Works	Landscaping Building works

It is estimated that the GCIMP project would be constructed over a 30-month period. The proposed construction activities associated with the development and the corresponding construction timeframes are outlined in Table 2.2.

The timing of the market construction of the GCIMP would be in accordance with favourable economic conditions. However the proponent does intend to proceed with the project within the imminent future.

Table 2.2 Construction program

Development phase	Timeframe
Construction of bunds/widening of river/marina works	8 months
Excavation, compaction, liming, drying	10 months
Pre-cast/engineering fill and rip rap	6 months
Road works and services	12 months
Landscaping works	6 months
First settlements	TBA
Handover and commissioning	TBA

Reconfiguration of lot

The survey and reconfiguration of lot (ROL) plans presented in the EIS identified a preliminary approach to subdivide the site over four stages. As the staging approach will rely heavily on the economic environment at a point in time, a final staging approach is yet to be finalised.

2.2.4. Infrastructure requirements

Construction

Thorough surveys of the existing utilities infrastructure at the site were conducted during the EIS process to identify its availability and capacity. The proponent then assessed the construction infrastructure requirements, including those of the project's workforce, against the capacity of the existing utilities infrastructure. This assessment concluded that the construction works phase of the project will not have an excessive demand on existing utilities infrastructure (further details can be found at Section 5.9 in this report).

Operational activities

State-controlled road network

The EIS stated that the finalised GCIMP is estimated to generate approximately 10 130 daily trips and up to 1100 peak hour trips on the surrounding road network once fully developed. This volume of traffic would affect the Pacific Motorway and Foxwell Road interchange and the Beattie Road/Service Road intersections, which are state-controlled roads.

TMR consider the project-related impacts on the state-controlled road network to be significant, particularly in relation to the operation of the Pacific Motorway/Foxwell Road interchange. TMR advised that the increase in demand on the Pacific Motorway connection has the potential to cause safety and efficiency impacts due to increased queues of stationary or slow-moving vehicles extending into the high-speed through lanes on the motorway.

All parties agree that the functionality and safety of the road network is paramount and note that, regardless of the proposed development, the interchange will require upgrading within the next 10 years.

Local road network

The EIS predicts minor impacts to the local road network. The proponent proposes to work with GCCC to provide upgrades to the roundabouts at the Shipper Drive, Waterways Drive and the site; and at the intersection of Shipper Drive, Ford Road and the site.

Electricity and telecommunications

Energex has advised that the two 11 kV feeders located in close proximity to the proposed GCIMP would not have enough capacity for the entire proposed development once completed. However, there are existing spare conduits available and the development site is not far from two new zone substations that would be able to meet the power demands for the proposed GCIMP development.

The proponent states that construction timing, staging and required load will be given to Energex prior to the commencement of construction, to enable a new zone substation to be planned and delivered.

Water supply

The proponent has committed to developing the GCIMP to meet the GCCC desired standards of service for potable water supply.

The EIS concludes that when the demands of the GCIMP are imposed on the system, no detrimental effects are incurred in the surrounding water network. The GCIMP would connect to the existing 225-millimetre (mm) diameter water main in Waterway Drive while continuing to meet GCCC's water service standards.

Wastewater/sewerage

The development proposes to utilise an on-site pump station and rising main along Shipper Drive to connect to the alignment under the proposed allotments to the north of the GCIMP, which in turn connect to the Amity Way gravity line. All services would be aligned with existing roads; therefore, no easements would be required.

2.2.5. Dependencies and relationships with other projects

Existing Gold Coast marine precinct

The GCMP is the major marine industrial area within the Gold Coast dedicated to manufacturing, servicing, repairing and refitting recreational boats and has developed over a six-year period (see Figure 2.2). The critical mass achieved by its planning designation and the industries that have been established within the precinct has resulted in a growing industry for the Gold Coast region. The marine industries located at the GCMP contribute to the local economy and generate employment opportunities.

The GCIMP project seeks to develop 63.5 ha of the remaining designated marine industry precinct.

Figure 2.2 Aerial view of Gold Coast Marine Precinct with (project site in foreground)

Surrounding residential development

Canal development and modifications to the Coomera River have occurred over a 40-year period. Residential canal and marina developments intensified in the mid 1980s with the construction of Sanctuary Cove and since this time, there have been numerous similar developments such as Hope Island, Coomera Waters, River Links and Hope Harbour.

The popularity of the waterfront lifestyle and the success of the GCMP have resulted in heavy use of the Coomera River by vessels of all sizes for recreational and commercial purposes.

2.3. Project rationale

The GCIMP project is considered by the proponent to meet consumer demand, which has been evidenced through the continued increase in boat registrations. The proponent, as the owner of Maritimo boats, has also determined that it requires further facilities and site area to meet increased consumer demands. Unlike the existing marine precinct, the GCIMP proposes a range of land uses complementary to the marine industry to stimulate economic development.

As the project site owner, Maritimo has been involved throughout the concept design process of the project to ensure production facilities will meet the needs of the manufacturing industry, and that associated industries integrate with the production process.

Current GCCC Planning Scheme provisions strictly regulate the nature of land uses contemplated within the marine industry precinct. As the proposal has been developed in response to the needs of key industrial stakeholders (including the proponent), it proposes to expand the variety of land uses and activities on the site to widen the appeal of the precinct and attract more visitors.

Key project objectives are to:

- increase the supply of marina berths and boat maintenance facilities on the Gold Coast, through the development of a new marina and associated infrastructure
- provide additional dry dock storage to alleviate pressure on existing marine infrastructure
- create a mix of supporting land uses within the precinct to facilitate self-sufficiency within the precinct and improve the operational efficiency of the GCIMP
- broaden the economic base of the precinct to improve resilience to future economic downturns, such as the global financial crisis (GFC)
- provide another destination for boats on the Coomera River
- improve the utilisation of existing sunk infrastructure[2] which is currently developed to 30 per cent[3] of its capacity
- operate the marina in a manner that has an acceptable impact on surrounding communities and the environment
- develop and operate the GCIMP in accordance with best practice environmental management.[2]

As the proposed project is located within an area that has long been designated as marine industry, and given that the site has been planned for this scale and nature of development, the GCIMP is not considered to constrain any potential future development

Economic benefits

The EIS reported that the proposed GCIMP would generate approximately 2353 annual full-time equivalent (FTE) years during construction. The flow-on benefits of this employment would generate about 5178 FTE position years in Queensland, with 4354 FTE position years generated within the Gold Coast region.

The GCIMP project is forecast to provide the following economic and employment benefits to the local region and the state when completed and fully operational:

- The project is estimated to generate approximately $250m of annual export income for the region. This revenue contribution would contribute to positioning Queensland as the nation's leading recreational boat exporter, therefore adding to the region's appeal for visitors, events and business investments.
- The EIS reports that the indirect flow-on or multiplier effects of the project on the Gold Coast region and the Queensland economy are projected to be in order of $407m and $4 446 m respectively. The scale of this economic stimulus to the Gold

[2] For a definition, refer to the Glossary on page 189 of this report.
[3] Additional material to the EIS, App. 7, p. 2.

Coast is equivalent to between two and three per cent of its annual gross regional product.[2]

- Upon completion, the operating revenue of the proposal is projected to be in the order of $754.4m and the precinct is expected to provide approximately 2700 FTE operational employment positions.

Boat registrations

Gold Coast Waterways Authority (GCWA) reports that boat registrations in the Gold Coast area are now close to 28 000 recreationally registered boats and almost 700 commercially registered vessels.[4] The Gold Coast LGA has the largest number of boat registrations in any Queensland LGA.[5]

Whilst demand levels have not returned to those pre-GFC, there is evidence demand is increasing. Data from Marine Queensland shows that new boat registrations on the Gold Coast continued to rise even during the GFC in 2008[5] as boat registrations tend to increase with population growth.

Manufacturing and exporting

It is widely acknowledged that the Gold Coast is a leader in the manufacture of marine craft and that a large majority of leisure boats built in Australia are manufactured there. Despite the substantial market share, there has been a decline in the value of the marine industry on the Gold Coast, consistent with manufacturing in general across Australia.[6] Although not reaching pre-GFC levels of economic activity, the economic outputs of boat building on the Gold Coast in 2012 were estimated to be worth $472.1m with international exports estimated to be $47.5m.[6]

By providing additional manufacturing capability in the GCIMP, there is the potential to increase the economic value from the export of boats made on the Gold Coast.

The proponent, as one of the key marine industry investors on the Gold Coast, is well placed to judge the improvement in the marine industry market.

Project alternatives

The terms of reference (TOR) for the project required the proponent to identify alternative design options and potential alternative uses for the site. In particular, the proponent was required to discuss the options for dredge material disposal and reasons for choosing the preferred material disposal site.

Four alternatives for the site were identified in the EIS and are summarised as follows:

- **The preferred development concept—**this includes the development of the above stated concept, which includes a 40-metre setback to Oakey Creek and assumes acquisition of the GCCC park located on Shipper Drive.

[4] Gold Coast Waterways Authority, *Draft Waterways Management Strategy 2013–2023*, Gold Coast Waterways Authority, Main Beach, Queensland, 2013, viewed 29 November 2013, http://www.gcwa.qld.gov.au/userfiles/resources/static/GCWA-Strategy-Document.pdf.
[5] Marine Queensland, *2011 Fact Sheet—Gold Coast*, Marine Industry Data, Marine Queensland, East Brisbane, 2011, viewed 10 November 2013, http://www.marineqld.com.au/marine-industry-data_copy
[6] Giles Consulting International and Urban Systems, *Gold Coast Marine Precinct Strategic Review*, Additional information to the EIS, App. 7, p. 12, Giles Consulting, 2013, viewed 29 November 2013, http://www.gcintmarineprecinct.com.au/seis.php

- **Alternative 1—**this concept also includes a 40-metre setback to Oakey Creek and assumes the parkland, but proposes a significant portion (9 ha) of the site to be dedicated to the storage of dredge material rehandling.
- **Alternative 2—**this plan maintains a 40-metre setback to Oakey Creek, but does not include involve the acquisition of the Council Park, and a public boat ramp facility is accessed at the end of Shipper Drive.
- **Alternative 3**—this plan involves increasing the setback from Oakey Creek to 100 m. The public park is acquired through this alternative.
- **Alternative 4—**this is a status quo concept, which involves leaving the site in the current state of degraded rural land.

Two additional master plan options were presented in the additional information to the EIS and are summarised as follows:

- **Alternative 5**—this plan includes an 80-metre buffer, as requested by GCCC and the Department of Environment and Heritage Protection (DEHP) and resulted in a reduced external marina, mixed-use precinct and industrial subdivision component. This additional option has similar qualities and impacts to Option 4 of the EIS, which considered a 100-metre setback.
- **Alternative 6**—this is the proponent's preferred master plan, which has been refined following comments on the EIS resulting in 16 less external marina berths and conversion of the education land use to mixed-use.

As required by the TOR, assessments were provided in both the EIS and the additional information to the EIS, which looked at the economic impacts and environmental benefits of increasing the buffer sizes to 80 m and 100 m. From an economic perspective, both of these options resulted in a reduced external marina, mixed-use precinct and industrial subdivision component reducing the overall economic value of the project, as would be expected. From an environmental perspective, increasing the buffer to 80 m would only provide a minimal ecological benefit to the creek and preserve an additional 3.2 ha of saltmarsh, which the proponent is prepared to offset.

Dredge material disposal options

As required by the TOR, the EIS presented a number of options in relation to potential dredge material disposal methods for both the GCIMP and for the future maintenance dredging of navigation channels in the Coomera River. Disposal options for Coomera River maintenance dredged material included:

- a long-distance pipeline that would transport material up to Jacob's Well and potentially provide a 100-year solution to disposal of dredge materials
- an on-site re-handling facility consisting of five resettlement ponds
- use of geo-textile bags, which act as a filter for dewatering the dredged material.

Provision for a 2.2-ha dredged material disposal option has been provided for in the master plan to dispose of the precinct's dredge material.

3. Impact assessment process

3.1. Overview

This section details the steps in the project's EIS assessment process. For a detailed explanation of the EIS process, refer to **www.dsdip.qld.gov.au/cg**

In undertaking this evaluation, I have considered the following:

- initial advice statement (IAS)
- EIS
- issues raised in submissions relating to the EIS
- additional information to the EIS
- technical reports
- agency advice from:
  - Gold Coast City Council
  - Department of Environment and Heritage
  - Gold Coast Waterways Authority
  - Department of Transport and Main Roads
  - Department of Natural Resources and Mines
- comments and properly made submissions[7] from members of the public.

Table 3.1 shows the steps taken in the project's EIS process.

Table 3.1 Overview of EIS process

Date	Process
23 March 2008	Final IAS and request for project declaration received
24 April 2008	Project originally declared to be a 'coordinated project'
27 April 2008	Australian Government determined project is a 'controlled action'
15 October 2008	Submission period on draft TOR commenced
17 November 2008	Submission period on draft TOR closed
29 March 2009	TOR finalised
29 March 2011	Project declaration lapsed
17 June 2011	Final IAS, project revision and request for project declaration received
7 July 2011	Project declared a 'coordinated project' by Coordinator-General (declaration re-issued)
10 September 2011	Submission period on draft terms of reference (TOR) commenced
7 October 2011	Submission period on draft TOR closed
22 December 2011	TOR finalised
19 August 2012	EIS provided to Coordinator-General for evaluation

[7] For a definition of a 'properly made submission', refer to the Glossary on page 189 of this report.

Date	Process
6 October 2012	EIS released for public and agency comment
5 November 2012	Submission period on EIS closed
21 December 2012	Proponent requested to provide additional information to the EIS
4 October 2013	Additional information to the EIS provided to Coordinator-General for evaluation
21 October 2013	Additional information to the EIS information available for agency comment
15 November 2013	Submission period on additional information to the EIS closed

3.2. Coordinated project declaration

On 7 July 2011, the Coordinator-General declared this project to be a 'significant project' under section 26(1)(a) of the Queensland *State Development and Public Works Organisation Act 1971* (SDPWO Act). This declaration initiated the statutory environmental impact evaluation procedure of Part 4 of the Act, which required the proponent to prepare an EIS for the project.

The SDPWO Act was amended in 2012 (with the amendments taking effect on 21 December 2012). The amendments have renamed 'significant project' to 'coordinated project'. The project will be referred to as a coordinated project throughout this evaluation report.

3.3. Controlled action

On 27 April 2008, the Commonwealth Minister for the Environment[8] determined that the project is a 'controlled action'[9] under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act).

The relevant controlling provisions under the EPBC Act are:

- sections 16 and 17(b) wetlands of international importance
- sections 18 and 18(a) listed threatened species and ecological communities
- sections 20 and 20(a) migratory species protected under international agreements.

A bilateral agreement exists between the Australian and Queensland governments that allows the Queensland Government to conduct the EIS assessment process to meet the needs of both jurisdictions. Section 6 (Matters of national environmental significance), lists each controlling provision under the EPBC Act and explains the extent to which the Queensland Government EIS process addresses the actual or likely impacts of the project on the matters covered by each provision.

The Queensland Government has completed the assessment of matters of national environmental significance under the EPBC Act, on behalf of the Commonwealth Department of the Environment (DOTE). This report provides the assessment of all

[8] Formerly the Minister for Sustainability, Environment, Water, Population and Communities
[9] For a definition of 'controlled action', refer to the Glossary on page 189 of this report.

environmental matters during the EIS process for both the State and Commonwealth jurisdictions. The Commonwealth Environment Minister will use the information in this report to determine whether or not to approve the project under the EPBC Act.

3.4. Terms of reference

The draft TOR for the EIS for the proposed project was released for public and advisory agency comment from 10 September 2011 to 7 October 2011. Fifteen submissions were received, comprising 12 from advisory agencies, one from a non-government organisation and two from public submitters.

A final TOR was prepared having regard to submissions received and was issued to the proponent on 22 December 2011.

3.5. Review of the EIS

The EIS, prepared by the proponent, was released for public and agency comment from 6 October 2012 to 5 November 2012.

A total of 17 submissions (see Table 3.2) was received, copies of which were forwarded to the proponent and DOTE.

There were no submissions from the general public. A company representing the adjacent development (the Gold Coast City Marina and Shipyard) did provide a submission, which raised issues relating to the mix of land uses proposed for the site, lack of economic need for the proposal and loss of public parkland.

Table 3.2 Public and agency comments received on the EIS

Agency	No. submissions	Issue
Queensland Government	**14**	
Department of Transport and Main Roads		• Validity of traffic volume data • Provision of a regional dredge spoil solution (MSQ) • Contributions to road network
Department of Community Safety		• Emergency management procedures for flooding
Department of Agriculture, Fisheries and Forestry		• Risks from terrestrial pest animal • Fish habitat impacts and offsets
Queensland Health		• Noise and air quality
Queensland Police Service		• Traffic management, major incident planning
Department of Natural Resources and Mines		• Acid sulfate soils • Vegetation clearing

Agency	No. submissions	Issue
• Department of State Development, Infrastructure and Planning (Regional Services)		• Notes that the proposal will being positive economic impacts to support a declining industry on the Gold Coast
• Department of Environment and Heritage Protection		• Surface water quality, water and sediment quality, dredging, dewatering, monitoring, Environmentally Relevant Activity (ERA) approvals
• Department of Aboriginal and Torres Strait Islander and Multicultural Affairs		• Cultural Heritage Management Plan • Informing proponent of new traditional owner group • Indigenous employment plan
• Department of Education, Training and TAFE		• Will not be establishing a TAFE on site
• Skills Queensland		• Notes that the Gold Coast has the workforce available to construct the project
• Department of Justice and Attorney General		• Notes there are no major hazard facilities at the proposed development
• Department of Communities, Child Safety and Disability Services		• Notes that the project has recognised the access needs for people with disabilities
• Department of Housing and Public works		• No comments/issues
Australian Government	**1**	
• Department of the Environment		• Enough information contained within the EIS to complete the assessment under the EPBC Act
Local Government	**1**	
• Gold Coast City Council		• Flood modelling and potential flood impacts, • Management of acid sulfate soils, • Provision of regional dredge spoil solution • Proposed mix of land uses
Private organisations/ community groups	**1**	
• Gold Coast City Marina and Shipyard		• Proposed mix of land uses • Lack of economic need for the proposal • Loss of public parkland
TOTAL	**17**	

3.6. Additional information to the EIS

On 21 December 2012, I requested that Harbour Island Pty Ltd submit additional information to address the following matters:

- revised flood impact modelling
- cost benefit analysis on dredge spoil disposal options
- variations to master plan options and assessment of the impacts of these options
- aids to marine navigation management plan
- the management of acid sulfate soils.

3.7. Review of additional information to the EIS

On 4 October 2013, the proponent provided additional information to the EIS. I approved the release of this additional information for agency comment between 21 October 2013 and 15 November 2013. Seven submissions were received from government agencies and copies of the submissions were forwarded to the proponent.

4. Project approvals

Following the release of this evaluation report, the proponent will need to obtain a range of approvals from the Local, State and Australian governments, before the project can lawfully proceed. In regard to approvals under State law, I have stipulated certain conditions that must be part of such approvals by the relevant agencies. These conditions are contained in appendices 1 and 4 of this report. Approving agencies may add further conditions to approvals if considered necessary, but these must be consistent with the conditions stated in this report.

Table 4.1 lists approvals sought by the proponent directly from this Coordinator-General's evaluation report. Approvals and permits, approving agencies and associated legislation are listed for the project post Coordinator-General's evaluation report in tables 4.2–4.4.

Table 4.1 Approvals and permits required for the project from the EIS process

Agency	Legislation	Approval/permit
Gold Coast City Council	*Sustainable Planning Act 2009*	• Preliminary approval for material change of use (mixed-use development) to vary the effect of the planning scheme under section 242 • Preliminary approval for reconfiguration of lot— 63 freehold allotments, 9 community title allotments, new public road and new public open space • Preliminary approval for reconfiguration of lot— sea bed lease • Preliminary approval for operational work— bulk earthworks • Preliminary approval for operational work— tidal work, changes to ground level—retaining walls and tree clearing
Department of the Environment (Cwlth)	EPBC Act	• Controlled action

Table 4.2 Initial development applications—whole of site

Agency	Legislation	Approval/permit
Gold Coast City Council	*Sustainable Planning Act 2009*	• Development permit for operational works—bulk earthworks • Development permit for operational works—tidal works (including prescribed tidal works) • Development permit for operational works—taking or interfering with water • Development permit for operational works—creating an artificial waterway • Development permit—reconfiguration of lot • ERA 16—dredging • Operational works—change to ground level, vegetation clearing and works for infrastructure
Department of Natural Resources and Mines	*Land Act 1994*	• Term lease over the bed and banks of the Coomera River adjacent to Lot 98 on SP150731 • Purchase of all or part of Lot 108 on WD6404 being State land—Reserve for park and recreation purposes within the GCCC as trustee • Purchase of all or part of Lot 35 on SP150730 being State land—reserve for road purposes with DTMR as trustee

Table 4.3 Subsequent development applications

Agency	Legislation	Approval/permit
Gold Coast City Council	*Sustainable Planning Act 2009*	• Material change of use—marina • Development permit for operational works—infrastructure • Development permit for operational works—landscaping

Table 4.4 Individual development applications

Agency	Legislation	Approval/permit
Gold Coast City Council	*Sustainable Planning Act 2009*	• Material changes of use for land uses identified within the GCIMP Development Code • ERA application for boat maintenance and repair
Department of Environment and Heritage Protection	*Environmental Protection Act 1994*	• ERA applications for: – chemical storage – plastic product manufacturing
Building Certifier	*Building Act 1975*	• Certification that buildings have been constructed in accordance with the Queensland Development Code and the *Building Act 1975*

4.2. Local government approvals

The proposal constitutes 'development'[10] as defined by the *Sustainable Planning Act 2009* (SPA). Under SPA, the EIS can be considered an application for a preliminary approval to vary the effect of the planning scheme. The EIS also seeks preliminary approvals for a development permit for reconfiguration of a lot and operational works. Final approvals will be subject to impact assessment against the provisions of the Gold Coast Planning Scheme 2003 or the new GCCC Planning Scheme when adopted in 2015.

The intent of the preliminary approval is to establish the framework for the future development of the project and proposes a variety of uses which would complement the existing marine precinct in Coomera. To achieve this, a concept master plan, a precinct plan and an alternative development code have been proposed to replace the Coomera Local Area Plan which currently regulates development over the site.

Following the issuing of a preliminary approval pursuant to section 242 of SPA, it is intended that further material changes of use applications would be lodged with GCCC and assessed against the provisions of the new development code, to achieve development of the precinct.

4.3. State government approvals

The principal statutory approvals necessary for the development of the project that will need to be sought subsequent to this EIS evaluation include applications to the Department of Natural Resources and Mines (DNRM) to acquire William Guise Foxwell Park and the creation of a seabed lease for the external marina. ERAs will also need to be obtained from EHP for the storing of chemicals and plastic product manufacturing. The proponent will also need to obtain a quarry material allocation for dredging from EHP.

State agencies have provided comments and conditions for certain approvals to be attached to this Coordinator-General's evaluation report and subsequent development applications.

Furthermore, subsequent development applications made to GCCC for assessment under SPA will trigger State agency involvement as a concurrence or referral agency.

4.3.1. Management plans

Overview

Management plans for acid sulfate soils, construction management and site operations were submitted in the EIS. While updated management plans were not submitted with the additional information to the EIS, the proponent has committed to refining and expanding the management plans following detailed design before construction commences.

[10] For a definition of 'development', refer to the Glossary on page 189 of this report

Amended management plans that address the specific aspects raised by DEHP, GCCC, the Department of Agriculture, Fisheries and Forestry and DNRM submissions on the EIS and additional information to the EIS, are to be prepared through subsequent applications. It is expected the amended management plans would address in detail issues such as:

- air quality
- acoustic quality
- water quality
- acid sulfate soils management
- location, type, quantity etc. of chemicals
- emergency management
- environmental risk management.

Implementation of the management plans will satisfy the commitments made by the proponent in the EIS, additional information to the EIS project, and in correspondence with advisory agencies; and would ensure environmental impacts of the project are appropriately managed.

Coordinator-General's conclusion

I consider that the proponent has provided sufficient information in the management plans contained within the EIS to demonstrate that the proponent would implement all necessary actions to manage the environmental risks of developing and operating the GCIMP.

4.4. Australian Government approvals

As described in Section 3.3, the project has been determined a controlled action and must be approved by the Commonwealth Minister for the Environment under Part 9 of the EPBC Act.

Therefore, subsequent to this report, the controlled action will be considered for approval under section 133 of the EPBC Act once the Commonwealth Minister has received this evaluation report prepared under section 35 of the SDPWO Act.

5. Evaluation of environmental impacts

5.1. Terrestrial environment

This section of the report provides an assessment of terrestrial state significant biodiversity values[11] (SSBV) that may be impacted by the project. For further discussion on MNES affected by the project, refer to Section 66 of this report.

5.1.1. Context

The project is located within the mid estuarine reach of the Coomera River catchment, approximately nine km upstream from the mouth of the Coomera River. The site is located within an area that has been designated for marine industry use by the GCCC and is situated close to a number of existing marine industry developments, including the adjacent Gold Coast City Marina and ship yard facilities and a small marine centre further to the south across Beattie Road.

The total project area encompasses 63.5 ha. Approximately 42 ha (66 per cent) of this area is proposed to be developed and the remaining undeveloped area would include a 40 m naturally vegetated setback from Oakey Creek (4.9 ha) and landscaped public access facilities on the riverfront alongside the marina.

Existing uses on the site include livestock grazing, recreational use by fisherman and a model plane flying club. The site is considered to be largely degraded as result of grazing and associated historical clearing. Most of the vegetation on the site is disturbed with fragmented remnant vegetation (see Figure 5.1) communities mostly restricted to the riparian zone along Oakey Creek and the western and southern boundaries adjacent to Shipper Drive. The site is predominantly comprised of non-remnant vegetation (i.e. grassland and pasture species) which cover 36.85 ha (58 per cent) of the site.

[11] State Significant Biodiversity Values means the values identified Appendix One in State Significant Biodiversity Values of the Queensland Biodiversity Offset Policy (Version 1 dated 3 October 2011)

Figure 5.1 Fragmented vegetation along Oakey Creek

The overall topography of the site is characterised as low-lying with terrain ranging from reduced level (RL) 1.0 m AHD to RL 1.5 AHD and a minor gradient ranging from 0 to 1 per cent. Due to the flat terrain, the site often experiences ponding after periods of rainfall which has resulted in the formation of semi-perennial ponds and submerged wetlands across the site. As a result of the general gradient there is also no main watercourse traversing the site.

The proposed development site can be divided into seven internal catchments. Five of the internal catchments discharge to the north of the site towards Oakey Creek and the other two catchments discharge to the east of the site, towards the Coomera River. There are also a series of excavated drainage channels (Figure 5.2) in the eastern section of the site which discharge into the Coomera River and Oakey Creek.

Figure 5.2 Drainage channel to the Coomera River

5.1.2. Terrestrial flora

Notable flora

Desktop studies and field surveys recorded a detailed flora inventory of the site, which recorded 66 species of native Australian flora and 49 exotic flora species. Surveys did not record any flora species listed under Commonwealth conservation legislation. Only one species (*Macadamia tetraphylla*) which is listed as vulnerable under the Queensland Nature Conservation (Wildlife) Regulation 2006 was identified on the south west corner of the site. This species is proposed to be retained within the proposed 40 m buffer.

Being tidally influenced (i.e. 26 ha being tidally inundated on the highest astronomical tide (HAT)) a large proportion (27.7 ha) of remnant vegetation on the site is considered to be estuarine wetland vegetation. The remaining 3.48 ha of remnant vegetation is considered to be palustrine (freshwater) wetland vegetation. The regional ecosystems that are characterised as estuarine wetland are discussed further in section 5.2 of this report. The regional ecosystems that were identified on the site are provided in Table 5.1 and Figure 5.3.

Table 5.1 Regional ecosystems found on site

DNRM RE designation	Short description	VMA class/ wetland	Regional remnant extent 2001 (ha)	Planit Consulting mapping	Location	Extent within the site and DTMR allotment (ha)
12.1.1	*Casuarina glauca* open forest on margins of marine clay plains	Of concern, estuarine wetland	934	Community 1A: Mid-high open forest/forest (*Casuarina glauca*) on tidal mudflats	North-western section of the site on areas mapped as containing tidal mudflats	2.1564
12.1.2	Saltpan vegetation including grassland and herbland on marine clay plains	Least concern, estuarine wetland	559	Community 2A: Very tall rushland (*Juncus krausii*)	North West corner of the Lot 146 on SP 150731 adjacent to recent Oakey Creek bridging work	0.1946
				Community 2B: low closed tussock (*Sporobolus virginicus*) grassland	Occurring in all allotments including the future IRTC (Lot 35 SP150730)	22.3774
12.1.3	Mangrove Shrubland to low closed forest on marine clay plains and estuaries	Least concern, estuarine wetland	2803	RE not mapped on site, mapped as Community 3 Community 3: Low tall open forest/woodland (*Avicennia marina* + *Aegiceras corniculatum*)	Northern and western boundaries of the site in association with the banks of Oakey Creek	2.801
12.2.15	Swamps with Baumea spp., Juncus spp. and *Lepironia articulate*	Least concern, palustrine wetland	157	RE not mapped by Planit Consulting, described within Community 2 (RE 12.1.2)	-	-
12.3.5	*Malaleuca quinquenervia* open forest on coastal alluvium	Least concern, palustrine wetland	341	Community 1B: Mid-high forest (*Casuarina glauca*) on alluvial deposits	Adjacent to Shipper Drive on Lot 98 on SP150731 and Lot 108 WD6404	3.4788

EHP regional ecosystem mapping indicated the presence of regional ecosystem 12.2.15 on the site which is characterised as palustrine vegetation. Ground-truthing surveys indicated that vegetation 12.2.15 community is more likely to fall within the regional ecosystem 12.1.2 description due to the area being subject to tidal inundation and lack of palustrine wetland flora.

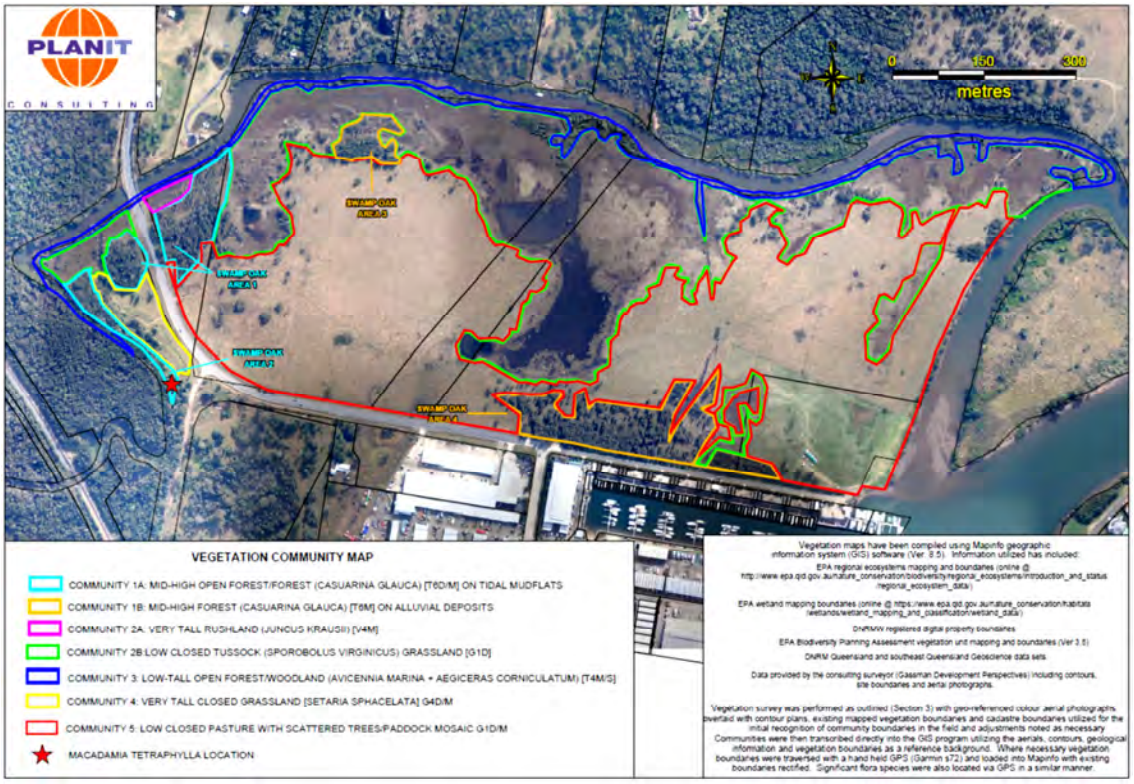

Figure 5.3 Terrestrial vegetation within the project area

Several species of weed were noted during field surveys including six species that are listed as declared pests under the provisions of the *Land Protection (Pest and Stock Route Management) Act 2002*. Class 2 and 3 declared pests are defined as being established in Queensland that can or could, have adverse economic, environmental or social impacts. Under section 77 of the *Land Protection (Pest and Stock Route Management) Act 2002*, land owners are required to ensure that land is kept free of Class 2 pests. These species are provided in Table 5.2. All other weeds on the site are considered to be environmental weeds.

Table 5.2 Declared weed species

Common name Species name	Classification under the *Land Protection (Pest and Stock Route Management) Act 2002*
Lantana *Lantana camara*	Class 3
Asparagus fern *Asparagus ssp.*	Class 3
Groundsel *Baccharis halimifolia*	Class 2
Fireweed *Senecio madagascariensis*	Class 2
Singapore daisy *Sphagneticola trilobata*	Class 3
Blackberry *Rubus fruticosus*	Class 3

Referable wetlands

EHP mapping shows the site as containing 'referable wetlands' and areas of high ecological significance i.e. containing 'of concern' regional ecosystems, essential habitat for threatened species and wetlands.

Field surveys indicated that the identification of referable wetlands and areas of high ecological significance within the proposed development area is not an accurate reflection of the existing values given the history of vegetation clearance, grazing and landform modification. Areas that demonstrated a higher ecological value were predominantly found in the riparian zones along the creeks and on the edge of the site along Shipper Drive.

5.1.3. Project impacts and mitigation measures– terrestrial flora

Vegetation clearing

Up to 53.68 ha of vegetation is proposed to be disturbed or removed through vegetation clearing and filling of the site. This would include 20.48 ha of remnant vegetation, including 0.815 ha of vegetation with an 'of concern' *Vegetation Management Act 1999* (VM) status and 19.67 ha of vegetation with a 'least concern' VM status (see Table 5.3). The remaining 33.2 ha of the vegetation to be removed is considered to be non-remnant. Refer to Table 5.3 for the areas of regional ecosystems to be cleared.

Table 5.3 Remnant vegetation impacted

Mapped Community	DNRM RE designation	VMA class	Regional remnant extent 2001 (ha)	Approx extent within the site and DTMR allotment (ha)	Extent to be disturbed /cleared (ha)	Impacted on site (%)	Impacted regional (%)
Community 1A	12.1.1	Of concern	934	2.156	0.815	37.79	0.09
Community 1B	12.3.5	Least concern	341	3.4788	3.4788	100	1.02
Community 2A	12.1.2	Least concern	559	0.19	0	0	0
Community 2B				22.37	15.45	71.29	2.85
Community 3	12.1.3	Least concern	2803	2.735	0.74	26.42	0.03
Total				**30.9298**	**20.4838**		

The remaining areas of remnant vegetation (10.4 ha) would be retained within the 40 metre setback along Oakey Creek and the western section of the site.

The EIS stated that the proposed 40 m setback is intended to create a buffer between the development and the environmental values associated with Oakey Creek. No embellishments are proposed with the exception of vehicle exclusion bollards, maintenance access gates and a pedestrian/cycle path aligned parallel with the northern sections of the buffer.

As part of the EIS investigations the proponent assessed an alternative option 6 which included the 80 m setback requested by EHP and GCCC. The assessment concluded that an 80 m setback would have minimal environmental benefit (e.g. 4.32 additional ha of 'community 2B, low tussock (*sporobulus virginicus*) grassland) and would significantly diminish the social and economic benefits that would be achieved with the 40 m setback.

Upon completion of the rehabilitation of the setback, the open space areas would be dedicated as open space to GCCC.

5.1.4. Coordinator-General conclusions

I note that the proposed clearing of vegetation on the site includes the removal of 0.815 ha of 'of concern' and 19.67 ha of 'least concern' remnant vegetation. The 'of concern' regional ecosystem 12.1.1 is considered to be estuarine wetland and is discussed further in Section 5.2. No threatened flora species or regional ecosystems are present in the site and will not be cleared for the project.

I accept that the proposed clearing of native vegetation would be a necessary part of the project and consider that it would have a minor impact on the overall regional representation of these vegetation communities. Detailed development plans would need to demonstrate that the extent of clearing is minimised and that the project does not result in indirect impacts to terrestrial vegetation that will not be cleared.

I note the proponent's commitment to rehabilitate and surrender the 40 m buffer area to GCCC and consider this an appropriate outcome.

I state conditions in this report to ensure the appropriate management of impacts to terrestrial flora.

5.1.5. Terrestrial fauna

Fauna surveys identified a total of 137 terrestrial fauna species as being present at the site, comprising of the following:

- 100 species of birds
- 8 species of reptiles
- 6 species of frogs
- 23 species of mammals

The EIS identified five terrestrial species listed under the Nature Conservation (Wildlife) Regulation 2006 (NC Reg) have the potential to occur in the project area, including the following:

- Black-necked stork (*Ephippiorhynchus asiaticus*), near threatened
- Glossy black cockatoo (*Calyptorhynchus lathami*), vulnerable
- Wallum sedgefrog (*Litoria oblongurensis*), vulnerable
- Wallum froglet (*Crinia tinnula*), vulnerable
- Water mouse (*Xeromys myoides*), vulnerable

Other terrestrial species that are listed under the Commonwealth government's EPBC Act (listed threatened and migratory species) and have the potential to occur in the project area are discussed further in Section 6 of this report.

The EIS reported that the site is mapped as containing 'essential habitat' for wallum froglet and wallum sedgefrog, associated with regional ecosystems 12.2.15 and 12.3.5. Ground-truthing surveys indicated that these regional ecosystems provide less than three essential habitat factors required by these species. It is therefore considered unlikely that these vegetation communities provide essential habitat for these species.

Black-necked stork

The black-necked stork (also known as the jabiru) is typically associated with wetland, mudflat, mangrove and swamp habitats. This species is heavily reliant on wetland habitats for their main prey source, which includes fish and frogs.

This species has been regularly observed from within the Carrara Merrimac Floodplain on the Gold Coast to the south of the site and Sanctuary Cove and Hope Island immediately to the east of the site. The species has also been recorded within the Pimpama Conservation Area to north of the site.

This species was only identified during initial field surveys in 2008, and was not recorded during other survey periods. Suitable habitat for this species was identified on the site within the salt-marsh and semi-permanent wetland/waterbodies found in association with RE 2.1.2. The EIS outlined that the development of the site including the removal of 15.45 ha of estuarine intertidal habitat associated with the semi-permanent wetland would limit the continued use of the site by this species. Intensification of activities would also be expected to discourage this species from using the site.

Glossy black cockatoo

This species was not identified at the project site during field surveys, however was considered as potentially occurring on the site, as the species is known to occur in the area.

The Glossy Black-Cockatoo is highly dependent on the distribution of allocasuarina (she-oak) species and is found in woodland dominated by allocasuarina and in open forests where it forms a substantial middle layer. This species is often confined to remnant allocasuarina patches surrounded by cleared farmlands and requires tree hollows for breeding. Ground-truthing surveys indicated that the site contains casuarina species associated with regional ecosystems 12.1.1 and 12.3.5. However, this species *casuarina glauca* is not the preferred food tree species of the glossy black cockatoo. This species has a very restricted diet, feeding only on she-oak species *allocasuarina littoralis* and *allocasuarina torulosa*, *allocasuarina verticillata*. The glossy black cockatoo is also highly selective with respect to the trees and cones on which it forages and often shows fidelity to particular trees. Given that no glossy black cockatoos or visible remnants of cone chewing were observed on the site over the extended survey period, it is highly unlikely that this species uses the site.

The removal of 4.3 ha of casuarina *glauca* communities from the site is therefore considered unlikely to impact on this species. The remaining 1.34 ha of vegetation communities associated with regional ecosystem 12.1.1 would be retained within the 40 m buffer and the proponent has made a commitment to undertake vegetation plantings in the proposed buffer areas. Plantings would include *allocasuarina littoralis* and *allocasuarina torulosa* species.

The proponent has also made a commitment to install fauna boxes within the retained environmental parkland in the western section of the site to compensate for the loss of hollow bearing trees. The specific number, type and location of fauna boxes is to be provided in the amended fauna and flora management plans to be prepared through subsequent development applications.

Wallum sedgefrog and wallum froglet

EHP essential habitat mapping identified ‘essential habitat’ on the site associated with regional ecosystems 12.2.15 and 12.3.5 for wallum froglet (*Crinia tinnula*) and wallum sedgefrog (*Litoria oblongurensis*). Both species are scheduled as vulnerable under the Nature Conservation (Wildlife) Regulation 2006.

Essential habitat for the wallum froglet includes permanent to ephemeral acidic (pH 4.3-5.2) freshwater swamps and sedgelands and associated heathlands, or vegetation containing wallum banksia, melaleuca or eucalypt species. The wallum sedgefrog requires similar habitat which includes permanent to ephemeral freshwater swamp, sedgeland, lake, creek, acid wallum swamp or wallum creek and associated heathland or vegetation containing melaleuca species.

As previously discussed, the community mapped as 12.2.15 does not meet the regional ecosystem definition and the inundation of this area by saline waters makes this area unsuitable for these frog species.

Ground-truthing surveys indicated that the mapped regional ecosystem communities 12.3.5 have less than three essential habitat factors required for both wallum frog species. The areas were devoid of standing freshwater and heath and sedge vegetation and were identified as having a low diversity of ground cover with the lower strata being predominantly composed of saltmarsh species and/or pasture grasses. This habitat would therefore not be considered essential habitat for these frog species.

Neither species were identified through extensive survey effort.

It is considered that these species are unlikely to use the site, given the fact that extensive survey effort failed to locate either of these species and the absence of essential habitat factors from regional ecosystems 12.2.15 and 12.3.5. The loss of these vegetation communities from the site is therefore considered unlikely to impact on these species.

Nevertheless, the proponent has made a commitment to reconstruct the pasture areas within the 40 m buffer area in accordance with proposed swamp sclerophyll module which would involve vegetation plantings of flora species associated with regional ecosystem 12.3.5. These plantings would be expected to improve habitat in these areas, which may encourage the wallum froglet and wallum sedge frog to these areas.

Koala

The EIS indicated that the site is scheduled as koala assessable development area under the South East Queensland Koala State Planning Regulatory Provisions (SPRP)[12]. Whilst the site is scheduled as a koala assessable development area, the EIS reported that no koalas were identified during field surveys. The proponent has also considered that koalas would be unlikely to be found in this area due to the general absence of suitable feed trees and the lack of habitat connectivity as result of the site being bound by two waterways. It is also important to note that projects declared as a 'coordinated project' under section 26(1)(a) of the *State Development and Public Works Organisation Act 1971* are exempt from the SPRP.

Whilst the proposed development is unlikely to impact on this species, suitable food trees would be retained within the 40 m buffer and natural vegetation area along Oakey Creek. The proposed revegetation works in the buffer area would also include planting of koala food trees within the buffer area.

[12] Department of State Development, Infrastructure and Planning 2010, *South East Queensland Koala State Planning Regulatory Provisions*, February 2010, viewed 26 September 2013, http://www.dsdip.qld.gov.au/resources/plan/koala/seq-koala-state-planning-reg-provisions.pdf

Water mouse

The water mouse is listed as vulnerable under both the NC Act and EPBC Act. It was identified as potentially occurring in the project area through desktop studies and has been previously identified within the Coomera Waters development, the Pimpama River Conservation area and McCoys Creek. However, no individuals or evidence of presence was identified in field surveys.

This species is found in coastal habitats generally within salt marsh, mangroves and adjacent freshwater wetland habitats. Suitable habitat for this species was identified on the site, including the areas of mangrove and salt marsh along Oakey Creek.

Potential impacts to this species would be reduced by retaining suitable habitat within the proposed 40 m setback from Oakey Creek and the implementation of best practice stormwater and ASS management measures to minimise degradation in the proposed buffer zone. Habitat within the setback would also be enhanced through the removal of weeds from this area and implementation of a revegetation program. The construction of a retaining wall around the northern and western perimeter of the site would also assist in reducing impacts to the water mouse habitat by preventing earthwork activities from encroaching into the proposed buffer zone along Oakey Creek

Impacts on this species would also be reduced during construction through the implementation of a vegetation management plan. The vegetation management plan would include a number of measures to reduce injury to animals during vegetation clearing works.

Mitigation

Enhancement of retained fauna habitat values within the 40 m vegetation buffer and the natural vegetation area is proposed to increase the potential for native fauna to continue to utilise the area. Identified food resources for various species will be incorporated within revegetated/rehabilitated areas (i.e. allocasuarina species for glossy black cockatoos, eucalypts for koalas, nectar producing flora species for birds and bats).

Native understorey regeneration and additional supplementary plantings will provide cover for small native species from predators whilst moving throughout the 40 m vegetation buffer and natural vegetation area.

Impact on the black-necked stork would be addressed by the proposed offset strategy to compensate the removal of estuarine wetland vegetation.

5.1.6. Coordinator-General's conclusions—terrestrial fauna

While the above listed species have the potential to utilise habitat within the project site, it is unlikely that the areas of terrestrial vegetation to be removed provide important habitat, given the degraded nature of the habitat present within the site.

The proponent has proposed to retain suitable habitat within the 40 m setback from Oakey Creek. The setback is proposed to be enhanced through rehabilitation and revegetation works, which would be expected to improve habitat for native fauna.

5.2. Marine and coastal environment

5.2.1. Existing environment

Hydrodynamics

The site is located within the mid estuarine reach of the Coomera River and is tidally influenced predominantly by semi-diurnal tides that are propagated from the Broadwater. The tidal range near the site is typically one metre during spring tides and 0.6 m during neap tides.

The northern boundary of the site is Oakey Creek which flows into the Coomera River via a direct channel to the north of Foxwell Island and the secondary channel in front of the development. The depth of the secondary channel is shallow with a bed level typically around -1 m AHD.

Sediment

The bed of the Coomera River is predominantly made up of fine sediments including fine silt and clay material with some sand. The transport of sediment along the estuary is a complex process, with major influences from tidal and flood hydraulics. Tidal currents are considered to be responsible for the majority of the sediment transport in the study area.

The near surface sediments are considered to be uncontaminated. Sediment analysis conducted for the EIS concludes that all concentrations of trace metals, organotins, pesticides, and petroleum hydrocarbons are below *National Australian Guidelines for Dredging* screening levels, and in most cases, below laboratory detection limits.

Water quality

Between the 2012 to 2013 reporting period, the Coomera River catchment area and Coomera estuary received a 'B' grade for the Healthy Waterway Report Card, showing improvements in algae concentrations and continued excellent values for turbidity and dissolved oxygen. These values indicate that the overall water quality in the Coomera River is generally good with conditions meeting all key ecosystem health criteria in most of the reporting region; and with most key processes functional and critical habitats intact.

The proponent assessed the existing water quality of the Coomera River using the long-term water quality data collected for the Healthy Waterway's Ecosystem Health Monitoring Program (EHMP)[13] The EHMP water quality dataset is derived from water samples taken from seven sampling locations along the length of the Coomera River, from January 2000 to February 2009. The water quality parameters sampled for the program included potential for hydrogen (pH), dissolved oxygen (DO), turbidity, secchi depth (light penetration), nitrogen and phosphorus and chlorophyll-a (PAR). As total suspended solids (TSS) were not measured as part of this program additional water quality sampling was also undertaken to determine existing TSS concentrations. The

[13] Healthy Waterways Partnership 2010, Ecosystem Health Monitoring Program, http://www.healthywaterways.org/ehmphome.aspx

additional water quality samples were collected from twelve sampling locations, upstream and downstream from the proposed development site.

The water quality data was assessed against the Environmental Protection (Water) Policy 2009 Coomera River (EPP Coomera River) water quality objectives (WQOs). These WQOs are based on a management protection level for moderately disturbed aquatic ecosystems.

Analysis of the historical water quality data collected for the EHMP indicated that existing water quality conditions have been generally compliant with the WQOs. However there were some exceedances for nutrients (e.g. nitrogen and phosphorus), secchi depth and chlorophyll-a, at monitoring locations upstream from the proposed GCIMP site. The additional sampling indicated that the existing median TSS concentration (8.6 mg/L) is compliant with the WQO for TSS (i.e. below 20 mg/L).

Groundwater

Investigation of groundwater contours indicate that groundwater generally flows in a northerly direction, towards Oakey Creek and the Coomera River.

Seven bores (MW1, MW2, MW4, MW7, GW3 and GW7) were established and monitored over a five month period between May and September 2010.

Six rounds of monitoring data were recovered during the monitoring period. The analytes that were monitored included pH, electrical conductivity (EC), major anions (chloride, sulfate and alkalinity) and cations (calcium, magnesium, sodium, and potassium), total dissolved aluminium and total dissolved iron. The major anions and cations were measured to allow for statistical analysis of the dataset and quality assurance of laboratory results.

Analysis of the monitoring data recovered from the bores indicated:

- pH values ranging from 3.04 to 7.00 and a mean pH between 4.47 and 6.47. These pH values are considered to be typical of the alluvial stratigraphy of this setting
- EC ranging between 0.9 mS/cm to 91.8 mS/cm and mean electrical conductivity reading between 1.62 mS/cm to 58.7 mS/cm. All bores were recorded as brackish to saline, with highest EC's being recorded in the bores adjacent to Oakey Creek and the Coomera River which had an EC of greater than 40mS/cm and the lowest EC recorded in monitoring bore MW2 (<3.33Ms/CM)
- a mean concentration of total aluminium ranging from 17.24mg/L to 118.5mg/L and total iron ranging from 39.75mg/L to 298mg/L
- the concentration of dissolved metals were generally consistent during the monitoring period, with the exception of MW5 which recorded the largest range in iron concentration between <0.25 mg/L to 146mg/L.

Due to the site's previous agricultural land use surface water sample was collected at sampling point DP1 within the groundwater well on Lot 98 on SP150731. Sampling analysed for heavy metals Ar, Cd, Cr, Cu, Ni, Pb, Zn and Hg and organochlorine and organophosphate pesticides. Category F, EILs are used for sites that where occasional or frequent exposure to contaminants would be expected (i.e. sites used for commercial or industrial purposes). Analysis results of the samples recorded no

exceedances for organochlorine and organophosphate pesticides above the limit of reporting (LOR) or documented category F environmental investigation levels (EIL) thresholds (derived from the National Environment Protection Measure guidelines).

A surface water sample was collected at sampling point DP1 within the groundwater well on Lot 98 on SP150731 and analysed for heavy metals Ar, Cd, Cr, Cu, Ni, Pb, Zn and Hg and organochlorine and organophosphate pesticides. Analysis of the sample recorded no exceedances for organochlorine and organophosphate pesticides above the limit of reporting (LOR) or documented category F environmental investigation levels (EIL) thresholds (derived from the National Environment Protection Measure guidelines) . Category F, EILs are used for sites that where occasional or frequent exposure to contaminants would be expected (i.e. sites used for commercial or industrial purposes). Refer also contaminated land section of the marine coastal section.

The EIS indicated that whilst six rounds of monitoring data provided a good representation of background water quality characteristics, a minimum of 8 rounds of monitoring data would be required. Data would be collected and WQOs would be established prior to the commencement of the construction stage of the project.

Marine habitats

The proposed development site is located in the mid estuarine reach of the Coomera River approximately 3.3 km from the southern end of the Moreton Bay Marine Park. Moreton Bay Marine Park is recognised as Ramsar wetland and a wetland of national importance.

The broader Coombabah Lakelands Conservation Area is located approximately four km to the south of the proposed GCIMP site. This area protects over 1200 ha of riverine/estuarine and palustrine wetland habitat which are important to a number of threatened and migratory water bird species. This conservation area forms part the Moreton Bay to Clagiraba Critical Wildlife Corridor.

McCoys Creek Marine National Park and the Pimpama Rivers Conservation Cluster are located six km to the north of the proposed GCIMP site. The Pimpama River Conservation Reserves Cluster protects approximately 447.58 ha of coastal wetland habitat in the lower reaches of the Pimpama River.

Mangroves and salt marsh

Field surveys identified the site as containing a mixture of marine and terrestrial plant communities, with marine communities covering 42 per cent of the area (26.6 ha). The location of these marine plant communities are provided in Figure 5.4.

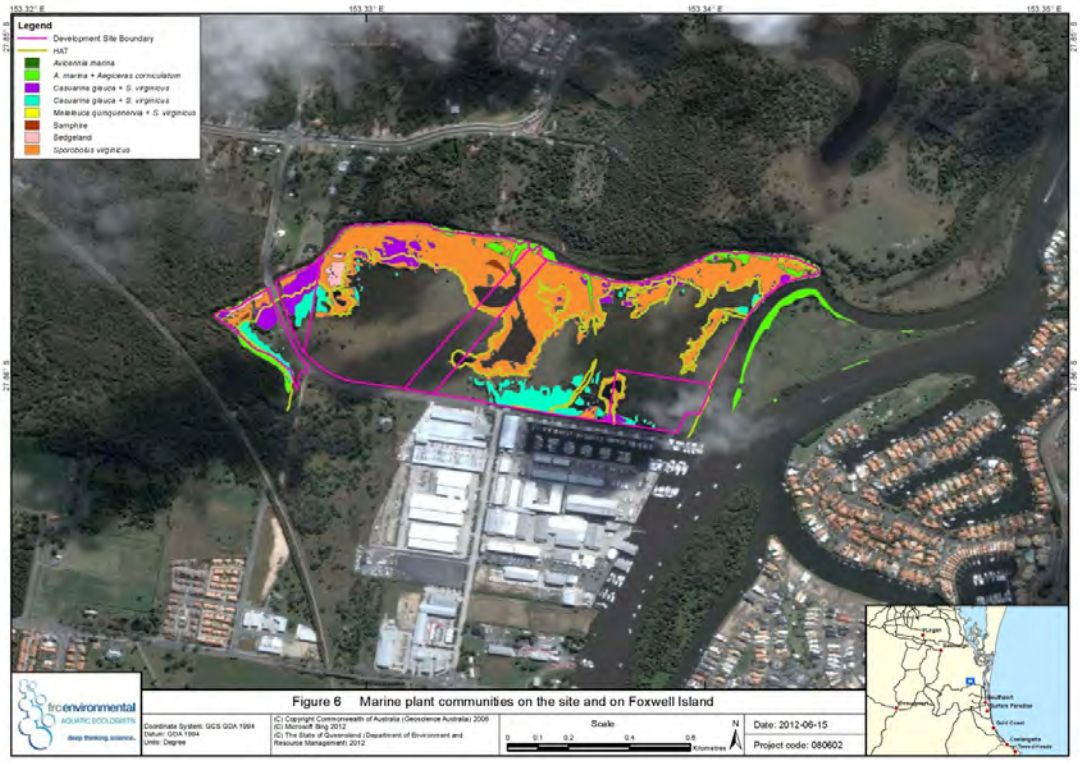

Figure 5.4 Marine plant communities

Marine plant communities were predominantly found in areas below the HAT and subjected to tidal inundation. Communities in these areas were described as providing 'fair' to 'good' fisheries values.

Mangrove communities predominantly composed of grey mangrove (*Avicennia marina*) were identified along the northern foreshore of Oakey Creek, the foreshore of the Coomera River and the western and northern foreshore of Foxwell Island. The mangrove communities surveyed on the foreshore of the Coomera River adjacent to Foxwell Island were identified as providing 'fair' fisheries value and were considered to be degraded (i.e. showing signs of erosion, low cover and weeds). More than 75 per cent of the mangroves surveyed along Oakey Creek foreshore were identified as providing 'good' to 'very good' fisheries value.

Salt marsh communities were found to cover most areas of the site below the HAT and surrounding the drains and water bodies. A small area of salt marsh was also identified above the HAT. Most of the saltmarsh communities on the site were identified as providing 'poor' fisheries value as result of cattle grazing and infrequent periods of inundation. The dominant salt marsh species included marine couch (*sporobolus virginicus*) and samphire (*sarcocornia spp. and suaeda spp*). Salt marsh communities that were considered to provide 'good' fisheries value were limited to the intertidal areas below the HAT, and excluded from grazing cattle and horses.

Seagrass and macro-algae communities

Seagrass and macro-algae communities are an important component of local ecosystems, supporting complex food webs and providing habitats to a range of fish and macro-invertebrate species and an important food source for dugong and green turtle.

During October 2008, and November 2010, the distribution and cover of seagrass and macroalgae was assessed along transects adjacent to the proposed development site, in Oakey Creek and the Coomera River.

Seagrass surveys did not identify any seagrass communities along the foreshore of the proposed development. Surveys identified patches of seagrass on the western side of Foxwell Island, largely composed of *Halophila ovalis* (*H.ovalis*) with some additional patches of *Halodule uninervis* (*H.ininervis*). The community at Foxwell Island was considered as having 'fair' fisheries value due to low cover (5 per cent cover) and the dominant species being *H.ovalis* which provides less protective cover than other seagrass species.

Seagrass beds were also identified approximately 800 m downstream from the project site in the Coomera River, consisting of very sparse *H. ovalis* and denser patches of *Halophila spinulosa*.

Further downstream seagrass is identified at the following locations:

- on the eastern side of Thompson Island
- in the canals of Hope Island
- opposite Sanctuary Cove
- in the canals of the Isle of Wings.

The extent of seagrass recorded during the survey in 2010 was significantly less than that recorded in the 2008 survey. This was considered to be a result of an extended period of high turbidity associated with the high level of rainfall received in this area prior to the 2010 survey.

Small sparse patches of algae including Sargassum flavicans attached to small rocks and Hypnea sp. on muddy shores were also recorded.

Fish habitat

The mouth of the Coomera River and the southern section of the Gold Coast Broadwater contain declared fish habitat areas (FHA). This includes the Coomera FHA which is located 1.09 km from the site and the Jumpinpin–Broadwater FHA located 9.14 km from the site. These areas are illustrated in Figure 5.5 and Figure 5.6 respectively.

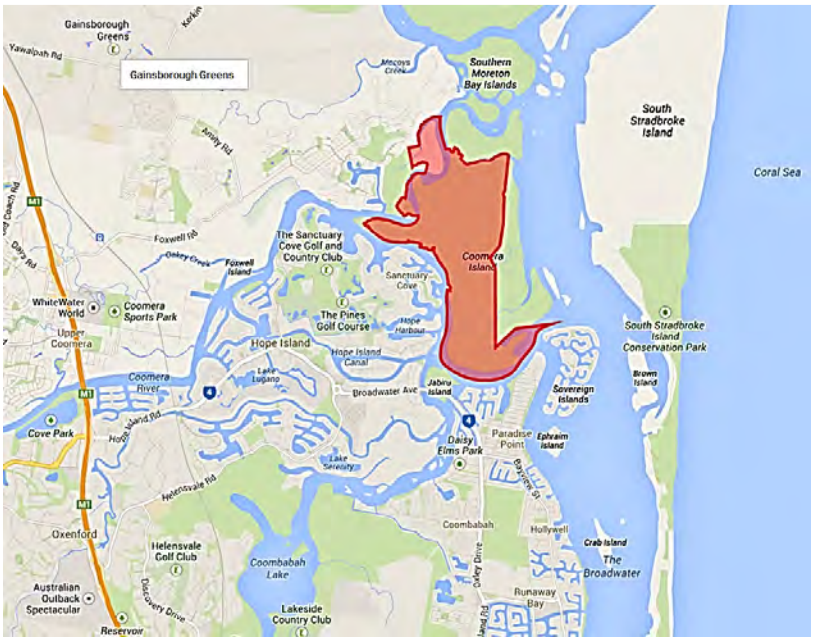

Figure 5.5 Coomera fish habitat area

These FHAs were gazetted to protect important fisheries habitat for the purpose of productive and sustainable fishing and to protect seagrass meadows and shallow estuarine areas that support local valuable commercial/recreational fish and crab fisheries.

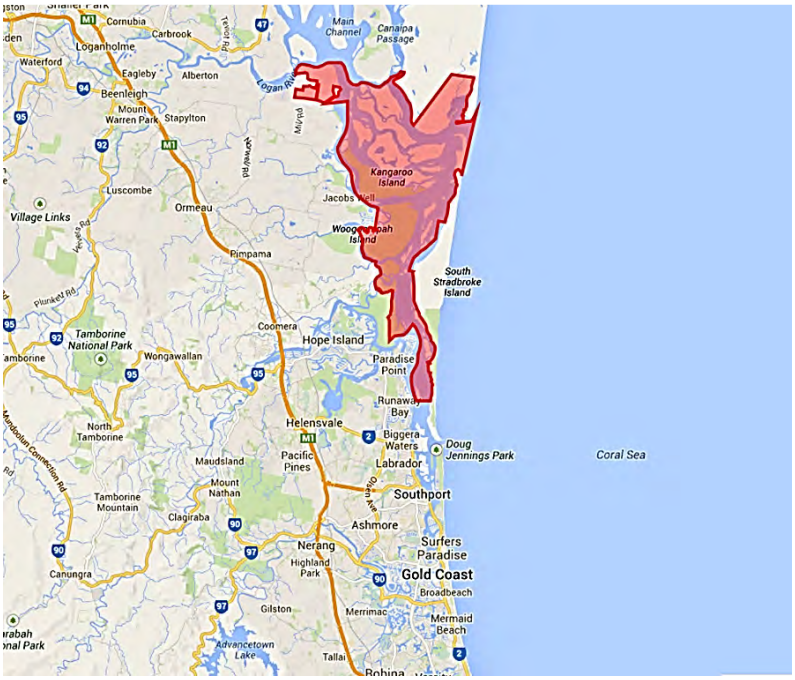

Figure 5.6 Jumpinpin–Broadwater fish habitat area

The EIS indicated there are a number of commercially and recreationally important fish and crustacean (prawns and crabs) species likely to use the estuarine habitats in the Coomera River (i.e. mangroves, seagrass, salt marsh, sand and mudflats and rubble banks). Species that were identified as potentially using these habitats include yellow-finned bream, snapper, dusky flathead, sea mullet, Spanish mackerel and mangrove jack, silver trevally, sand and mud crabs, banana and endeavour prawns, Sydney rock oyster and northern calamari.

Macro-invertebrate community surveys identified an abundance and diversity of species that generally reflect a system with good water quality (i.e. low turbidity and low levels of nutrients).

Marine fauna

Marine fauna discussed in this section are limited to those species that are listed under the NC Act. Marine fauna that are listed as threatened and/or migratory under the EPBC Act are discussed in Section 8 of this report.

The Coomera River discharges into the southern section of the Moreton Bay Marine Park. The Marine Park provides important habitat for diverse range of fauna including a large number of migratory shorebird and wader species, marine turtles, dugong, whales and dolphins and commercially and recreationally important fish species. Seagrass meadows in the marine park provide food and habitat for a range of marine turtle species, commercially and recreationally important fish and dugong.

Indo-pacific humpback dolphin

The EIS indicated several species of dolphin likely to use the Coomera River including Indo-Pacific humpback dolphin (*Sousa chinensis*) which is listed as near-threatened under the NC Reg. Whilst this species is identified as potentially occurring in the Coomera River, it not expected to be present for long periods due to their transient nature and preference for particular prey species

The Indo-Pacific humpback dolphin typically occurs in shallow coastal, estuarine, and occasionally riverine habitats, generally in depths of less than 20 m. This species is thought to be opportunist-generalist feeder, and is known to feed on a wide variety of coastal and estuarine-associated fishes. The western section of Moreton Bay and the lower reaches of the Brisbane River have been identified as key habitats for this species. Due to their coastal, estuarine distribution this species is particularly vulnerable to human activities in and adjacent to the coastal zone.

Dugongs

The dugong (*Dugong dugon*) is listed as vulnerable under the NC Reg. Herds of dugongs are found in wide, shallow, protected bays and mangrove channels, where they forage in large seagrass meadows. Whilst dugongs are mostly found in coastal waters they have also been identified using estuarine creeks and have been known travel several kilometres upstream.[14]

[14] Lawler, I., H. Marsh, B. McDonald & T. Stokes 2002, *Current State of Knowledge: Dugongs in the Great Barrier Reef*. CRC Reef Research Centre, Townsville.

Dugongs have a naturally low population growth rate due to their slow maturation, low birth rates and investment in their young, making dugong populations highly susceptible to both natural and anthropogenic influences.

Moreton Bay is a significant foraging and breeding ground for the dugong and is ranked among the top ten dugong habitats in Queensland. Dugong populations in Moreton Bay have been affected by major flooding events which have impacted on the availability of seagrass. For example during the 2010/2011 major flooding events, the seagrass cover in Moreton Bay declined by almost 50 per cent[15]. Following this event the annual stranding report for 2011 compiled by EHP indicated that dugong mortalities that year were highest on record[16]. Majority of mortalities were attributed to disease and ill health which is likely to correlate with the loss of seagrass during the 2010/2011 major flooding events.

The dominant seagrass species found in the Coomera River during surveys included *H. ovalis* and *H. uninervis,* which are the preferred foraging species for dugong[17]. These seagrass beds are therefore considered to potentially provide foraging habitat for dugong. Whilst the seagrass beds may provide suitable foraging habitat, the likelihood of dugong occurring in the Coomera River is considered to be low due to the large number of vessels currently using this area. There are many anecdotal reports that dugong avoid areas with high vessel traffic. Studies suggest that increased boat traffic has reduced dugong use of seagrass beds in the western side of Moreton Bay[18].

Marine turtles

All six of the marine turtle species known to occur in Australian waters have been recorded in Moreton Bay. The loggerhead and green turtle are known to inhabit Moreton Bay year round in relatively high numbers and the other species are known to only occur occasionally, in much lower numbers.

Moreton Bay is identified as a significant feeding ground for the loggerhead turtles and is considered to support the most significant concentration of young and mature loggerhead turtles in Australia. Moreton Bay is also identified as a significant feeding ground for green turtles particularly in the eastern and southern sections of the bay where there are extensive seagrass foraging areas.

All species are known to inhabitat shallow inshore waters with the exception of the leatherback turtle, which is mostly pelagic only coming into inshore waters during its nesting season. Turtle species most likely to occur in the project area include the green turtle which may forage on seagrass within the Coomera River.

Green turtles are particularly vulnerable to boat strike as they come to the surface to breathe and typically forage in relatively shallow waters. Boat strike can lead cause mortality or serious injuries. Serious injuries may also result in disruption to feeding

[15] CSIRO 2012, *Moreton Bay seagrasses make full recovery after the flood*, CSIRO 19 September 2012, viewed 27 September 2013, http://www.csiro.au/Portals/Media/Moreton-Bay-seagrasses-make-full-recovery-after-the-flood.aspx
[16] Meager, J.J. & Limpus, C.J. (2012) Marine wildlife stranding and mortality database annual report 2011. I *Dugong. Conservation Technical and Data Report* 2011 (1):1-30, viewed 27 September 2013, http://www.ehp.qld.gov.au/wildlife/pdf/dugong-report-2011.pdf
[17] Preen, A.R. 1995, *Diet of Dugongs:are they omnivores*, Journal of Mammalogy. 76:163-171
[18] Preen, A.R., 1992. *Interactions between dugongs and seagrass in a subtropical environment*. PhD thesis, School of Tropical Environment Studies and Geography. James Cook University, Townsville.

regimes, which may also result in death[19]. Boat strikes in the Moreton Bay Marine Park account for 50 per cent of boat strikes reported in Queensland[20]. Up to 50 turtles die every year from boat strike alone in the marine park.

The dominant seagrass species found in the Coomera River during field surveys, *H. ovalis,* are the preferred foraging species for green turtles[21]. Green turtles are also known to forage on propagules of the *A. marina* mangrove species, which are seasonally present in the Coomera River.

5.2.2. Proposed construction and operations

Project construction and operation activities that concern the marine and coastal environment include dredging and dry excavation for the widening of river between the development and Foxwell Island and the construction of the internal and external marina basins, earthworks associated with the filling of the site and maintenance dredging of the marina basins.

Marina basins

Construction of the internal marina and a portion of the channel widening would be undertaken using dry excavation techniques. These works would be undertaken using excavators, trucks and land-based machinery. The total volume of material to be removed via dry excavation techniques is expected to be in the order of 531,399 m³.

The proponent has proposed to fully contain the dry excavation works within a fully bunded area. The bunds would incorporate a water barrier membrane to isolate working areas and prevent dispersion of sediments and other pollutants to adjacent waterways. Silt curtains would be used during the construction of the temporary bunds to minimise dispersion of suspended sediments.

The internal marina basin would be excavated to an initial depth of -8 m AHD to accommodate the disposal of acid sulfate spoil from other areas of the site and would then be filled to a final depth of -4 m AHD. Upon completion of dry excavations the marina would be allowed to naturally fill with groundwater and would be connected to the Coomera River.

The remainder of the channel widening works and the construction of the external marina would be dredged using either a drag line or a long reach excavator set up on a perimeter bund or barge. The proposed works would involve widening the channel between Foxwell Island and the site by 7 ha and deepening the entrance channel and marina basin footprint to a depth of -4 m AHD. The volume of material to be removed from this area is expected to be in the order of approximately 120 000 m^3.

[19] Green Turtle http://www.ehp.qld.gov.au/wildlife/animals-az/green_turtle.html
[20] Department of National Parks, Recreation, Sport and Racing 2007, *Turtles*, http://www.nprsr.qld.gov.au/parks/moreton-bay/zoning/information-sheets/turtles.html, viewed 8 July 2013, Department of National Parks, Recreation, Sport and Racing,
21 Read, M.A. and Limpus, C.J. 2002, *The green turtle, Chelonia mydas, in Queensland: Feeding ecology of immature turtles in Moreton Bay*, Southeastern Queensland. Memoirs of the Queensland Museum 48(1): 207-214. Brisbane.

Excavated material would be placed in a treatment area, where it would be dried and treated for acid sulphate soils until suitable for reuse of construction fill material. Any treated material considered to be unsuitable for reuse would be disposed in the deep excavations of the marina canal or to an appropriately licensed landfill.

Maintenance dredging

The EIS reported that the external and internal marinas would require regular maintenance dredging to maintain a navigable depth for vessels. These areas are expected to have an annual sediment deposition rate of 5000 m^3. Maintenance dredging operations would be undertaken at 10 year intervals, and would remove approximately 50 000 m^3 of material. A cutter suction dredge would be used for maintenance dredging operations.

Dredge material generated during maintenance dredging is to be placed in settlement ponds in a 2.2 ha dredge material treatment facility proposed in the western precinct. The dredge material would be pumped to the settlement ponds in the designated dredge material treatment facility via a pipeline along Shipper Drive. This facility would serve as a dewatering and short-term storage area for dredged material during the maintenance dredging campaigns.

The dredge material would be dewatered progressively and the tailwater would be treated via a series of settlement ponds for the removal of suspended solids. Following the settlement of the dredge material within the treatment pond, tailwater would be immediately directed to a tailwater treatment system. Treated tailwaters would be discharged to Oakey Creek via a single release point.

Should GCCC/GCWA purchase part of the project site for regional dredge material handling facility, the dredge material would be handled at this facility. GCCC/GCWA would also install a pipeline to pump material to the rehandling facility.

Filling of the site

Major earthworks would be undertaken to fill 40.50 ha (65 per cent of the site) to the 1 per cent AEP flood level, 3.4 m AHD and for the construction of the revetment walls. This would require approximately 1.1 million m^3 of fill material. Approximately 515 000 m^3 of fill material (general fill and engineering fill) would be sourced from local external sources (for example the nearby development in the Coomera town centre). The EIS indicated that treated materials generated by dredging and excavation activities considered suitable for engineering fill may also be used as fill material.

Areas of the site underlain by soft and compressible clays would require placement of preload material over the fill to a final height of 6.3 m AHD to reduce the potential for differential settlement.

Approximately 83 000 m^3 of material would be used to construct temporary construction bunds and preloading. Material used for the construction of the temporary bunds would be sourced from topsoil stripped during site preparation works.

5.2.3. Project impacts and mitigation measures

Construction and operation of the marina basins and the access channel would potentially impact on the marine and coastal environment through contamination from suspended sediment concentrations, disturbance of acid sulfate soils (ASS) and potential ASS (PASS), and pollution from marina activities.

Coastal processes

Tidal hydrodynamics

The works associated with the filling of the site, wet excavations and the construction of the external marina are expected to have a local impact on the hydrodynamic conditions. The most significant changes would be expected to occur in the section of Oakey Creek adjacent to Foxwell Island and the secondary channel of the Coomera River between Foxwell Island and the proposed development. Hydrodynamic conditions would be expected to remain relatively unaffected in the main channel of the Coomera River between Foxwell and Hope Islands.

Hydrodynamic modelling undertaken to determine the impacts of the proposed development on existing hydrodynamic conditions indicated that:

- the construction of the external marina would be expected to cause a minor increase in peak tidal flow velocities and discharge volumes through the section of Oakey Creek adjacent to Foxwell Island. Peak ebb and flood flow velocities are expected to increase from approximately 0.30 m/s to 0.47 m/s and 0.22 m/s to 0.34 m/s respectively. Peak ebb and flood discharge volumes would be expected to increase by up to approximately 11.0 m^3/s and 6.5 m^3/s respectively (equating to an increase of approximately 50 and 30 per cent respectively)
- the peak tidal flow velocity within the secondary channel would be expected to decrease significantly due to the profile enlargement associated with the construction of the external marina. Peak ebb flow velocities are predicted to reduce from approximately 0.25 m/s to approximately 0.04 m/s

Sedimentation

Cohesive sediment transport modelling under a post-development configuration was used to model the potential effects of proposed development on sedimentation processes in Oakey Creek and the Coomera River. Modelling indicated that:

- under day to day conditions, the proposed dredged areas would be subject to sedimentation of fine materials, with an annual rate of sedimentation under tidal flow conditions in the order of 5 000 m^3 of in-situ fine sediment
- greatest rates of sedimentation are expected to occur around the confluence of Oakey Creek and the secondary channel of the Coomera River
- the rate of sedimentation due to occasional flooding events is estimated to be in the order of 16 000 m^3 over a 20 year period.

The increases in the section of Oakey Creek adjacent to Foxwell Island may result in localised redistribution of sediments however would not be expected to increase rates of bank erosion through this section of the creek.

Water quality

Dredging and excavation

Suspended sediment concentrations may increase in Coomera River and Oakey Creek during construction and operation of the project. Construction activities that may result in increased suspended sediment concentrations include capital dredging and dry excavations associated with the construction of the marina basins and the widening of the channel between the development site and Foxwell Island. Suspended sediment concentrations may also increase during maintenance dredging and during the discharge of tailwater from the maintenance dredge material treatment facility.

Capital and maintenance dredging works would be staged to confine the disturbance area and resulting turbid waters to each of the dredge bays. Silt curtains would also be installed around the disturbance areas to contain the dredge plume generated by these works.

Maintenance dredge material would be disposed of via the use of settlement ponds in the designated dredge material treatment facility in the western precinct. A number of settlement ponds would be used including a primary pond used to treat mainly sand and secondary pond to treat finer silt material. Tail-water from settling ponds would be discharged to Oakey Creek.

TSS plumes associated with the discharges have been modelled to determine the level of impact on the receiving environment. TSS concentrations would be expected to be highest at the point of discharge in Oakey Creek.

Following the settlement of the dredge material, tail-water would be immediately directed to a tail-water treatment system. Tail-water drains and pumps would be directed immediately underwater. Physical and chemical treatment would be undertaken where required to ensure the water quality of the tail-water is compliant with the stated performance criteria. No water is to be released from the tail-water treatment system without prior testing. The treatment system would be monitored daily to ensure no overtopping.

Tail-water discharge would not be discharged into receiving waters unless the water quality meets specified operational phase limits that are specified in the water quality release program.

Acid sulfate soils

Given that the site is located below 5 m AHD there is a high potential to disturb ASS/PASS material during earthworks and dredging associated with construction.

A preliminary acid sulphate soil investigation was conducted to identify whether ASS or PASS are present in the material to be excavated or dredged during the construction stage of the project. Field analysis results indicated that the majority of the screened samples were identified as having an initial pH ranging from 4.1 to 9.1 and no significant actual acidity (i.e. actual acid sulfate soils) as all samples had an initial pH greater than 4. Further laboratory analysis of 465 samples indicated that a high percentage of the soils in the investigation area are likely to contain PASS material. Out of the 465 samples analysed, 136 (24 of the 35 boreholes) were confirmed to

contain PASS material (i.e. exceeding the action threshold for oxidisable sulphur) and 38 samples (19 of the 35 boreholes) demonstrated actual acidity above actionable criteria.

Given the results of the preliminary sampling, acid sulfate soils would potentially be exposed through direct excavation and/or groundwater drawdown. The EIS outlined the proposed mitigation measures as described below.

Excavation material both wet and dry would be placed within ASS treatment beds contained within designated bunds and treated for ASS. Acid sulfate soils are to be managed by application of lime to neutralise their equivalent net acid generating potential. The potential for surface water and groundwater contamination would be reduced by diverting surface flows away from these areas and preparing the treatment beds with an adequate layer of lime to intercept any groundwater infiltration.

The proposed dry excavation works associated with the construction of the internal marina basin would be expected to result in groundwater drawdown from the edge of the excavation area. If not mitigated, groundwater drawdown would potentially cause sulfidic soils in the drawdown zone to become exposed and subsequently become oxidised (i.e. become acidic). This would pose a risk to groundwater quality, as acidic flushes may be brought to the surface when the ground waters return to the pre-development level upon the completion of the marina.

Groundwater drawdown management measures including recharge trenches would be implemented along the boundaries of the marina excavation areas. Groundwater seepage from the internal marina basin would be pumped into the recharge trenches to assist in limiting the extent of drawdown to the areas between the excavation area and recharge trench.

A groundwater monitoring program would be developed prior to the commencement of site works. Groundwater monitoring would be undertaken on a weekly basis during the construction phase to determine impacts on groundwater levels and ground water quality. A laboratory analysis for total acidity would also be undertaken on a monthly basis to determine the total potential acidity hazard that may be associated with groundwater at the site.

Groundwater levels would be expected return to the pre-development groundwater regime once the marina has been connected to the Coomera River. The EIS indicated that the introduction of a marina with an average groundwater level of 0.05 m AHD would not result in drawdown of the groundwater table during the operation of the project.

The proponent has proposed to prepare and implement an acid sulfate soil management plan (ASSMP) to manage and minimise impacts associated with the disturbance of acid sulfate soils during construction.

The ASSMP would be prepared in accordance with the Queensland Acid Sulfate Soils Investigation Team Soil Management Guidelines and would be developed to meet the requirements of the GCCC Planning Scheme Policy for Acid Sulfate Soils and the State Planning Policy (December 2013).

The impacts of acidic water releases would be mitigated by adhering to the water release program detailed in the ASSMP. All ponded surface waters and groundwater seepage within excavation areas, acid treatment or any water quality control structures would be tested and treated prior to any dewatering activities. All discharges would need to comply with the discharge performance criteria specified in the ASSMP before being released from the site.

Contaminated sediments

The soils in the excavation footprint are not expected to contain any concerning levels of sediment-associated contaminants such as heavy metal, BTEX compounds or organochlorine or organophoshate pesticides. Preliminary analysis of the soils within the proposed disturbance areas indicated that all concerning contaminants were either below National Environment Protection Measure environmental and health investigation level thresholds (heavy metals, pesticides) and/or the limit of reporting (pesticides, BTEX compounds). These NEPM thresholds are typically used for the assessment of site contamination for sites where occasional or frequent exposure to contaminants would be expected. This measure was considered appropriate based on the historical agricultural land use on the site.

Based on the results of the sediment sampling the EIS reported that there would be a low risk of releasing sediment-associated contaminants during the construction of the external and internal marinas.

Stormwater runoff

The proponent has committed to implement best practice stormwater management practices and design elements to ensure that runoff is adequately managed to protect the water quality of the receiving environment.

All stormwater control measures would be designed to comply with *Best Practice Erosion & Sediment Control for Building and Construction Sites* (International Erosion Control Association (Australasia) November 2008), *Best Practice Urban Stormwater Management – Erosion and Sediment Control*.

Construction

The project has the potential to generate a range of litter material including construction packaging and waste materials, paper and food packaging. The risk of gross pollutants entering receiving waterways during construction would be reduced by appropriate disposal of construction waste and implementation of erosion and sediment control devices.

All stormwater runoff from areas disturbed or exposed by construction activities would be designed to pass through erosion and sediment control devices including sediment ponds and silt fences to reduce the transport of sediments from these exposed areas to the receiving waterway.

Areas within the site that have a higher risk of impacting on stormwater quality (e.g. settlement ponds, ASS treatment beds and hazardous material storages) would also be contained within designated bund areas away from areas affected by surface water runoff.

Stormwater monitoring would be undertaken at regular intervals during construction to ensure compliance with water quality release criteria for stormwater runoff and discharges pumped from treatment devices (e.g. sedimentation basins). The water quality release criteria for the construction phase have been sourced from the *Urban Stormwater Quality Planning Guidelines 2010* which have been prepared to assist in the management of urban stormwater quantity and quality to protect the environmental values of waterways under the Queensland Environmental Protection (Water) Policy 2009.

Operation

The potential impacts associated with stormwater runoff during the operational phase of the project would be managed in accordance with a stormwater management plan and a spill prevention and emergency response plan.

The proposed conceptual layout for the GCIMP utilises water sensitive design principles and incorporates a range of landscape design elements to minimise sediment transport and peak stormwater flows. Internal stormwater drainage systems would be designed to flow through a treatment train of stormwater quality improvement devices such as bio-retention basins, turfed buffers and swales and gross pollutant traps, which would assist in the treatment to stormwater by removing suspended solids, nutrients (nitrogen and phosphorus) litter and gross pollutants.

Stormwater systems installed in the marina hardstand areas would incorporate oil and grit separators to remove coarse sediment and hydrocarbons. Wastewater from the oil and grit separators would be discharged to the sewer under a trade waste approval from GCCC. An oily water separator would also be installed to treat stormwater from underground storage fuel tank areas.

The risk of hydrocarbon spills would be managed by storing fuels, lubricants, oils and batteries and locating portable refuelling stations (above the designated flood level of nearby waterways) within bunded areas that have been designed and constructed in accordance with *AS1940 Storage and Handling of Flammable and Combustible Liquids–encompassing spill containment and response protocols*, to minimise the risk of hydrocarbon spills. Vehicle maintenance activities would also be conducted in these bunded areas. Potential spills during transport of these materials would be minimised by transporting these substances in accordance with the Australian Dangerous Good code by vehicles licensed to carry such material.

Operational activities including re-fuelling and wash-down activities would be undertaken within a designated bund area designed to contain any spillages and wastewater.

The volume of stormwater runoff would also be reduced through the use of rainwater tanks to harvest roof runoff for reuse on site (i.e. boat washing, irrigation and toilet flushing). These rainwater harvesting structures are expected to capture more than 3 ML of runoff per year. Attenuation of peak stormwater flows would assist in improving water quality by limiting the level of surface water runoff entering the stormwater systems.

The EIS indicated that load-based performance criteria would be used for stormwater discharges during the operational phase of the project. The load based performance criteria are based on the reduction in annual pollutant loads from the unmitigated development case. The load-based criteria have been sourced from the operational stormwater design objectives included in the Queensland Urban Stormwater Quality Planning Guidelines 2010 specifically for the Gold Coast and the SEQ region which have been refined by Gold Coast City Council and SEQ Healthy Waterways Partnership.

Stormwater quality treatment structures would be regularly maintained to ensure their effectiveness in achieving the load reduction targets. Stormwater monitoring would be undertaken at regular intervals during the operation of the project to ensure compliance with the operational stormwater design objectives

Ship-sourced pollutants

The risk of hydrocarbon contamination from marina operations would be managed through the implementation of stormwater management plan, spill kits and an oil spill response strategy in the event of oil spills. Fuel storage and handling activities would also be undertaken in accordance with *AS1940 Storage and Handling of Flammable and Combustible Liquids–encompassing spill containment and response protocols*, to minimise the risk of hydrocarbon spills.

Sewage reception facilities are to be provided for visiting vessels to reduce the potential release of wastewater to the receiving environment. Release of sewage from vessels is to be conducted in accordance with the requirements of the *Transport Operations (Marine Pollution) Act 1995* and associated regulations.

The GCIMP development incorporates design features that meet the requirements of the *Practice for Antifouling and In-water Hull Cleaning and Maintenance* (ANZECC)[22] to minimise the impact of antifouling paints on the surrounding environment. Vessel maintenance and cleaning would be carried out in designated areas and all wastewater runoff from dry-dock, hardstand and slip-way facilities would be adequately treated to remove any toxic substances.

The EIS indicates that the water exchange rate between of the marina basin and adjacent waters would be expected to be high as result of the moderately high current velocities and the wide width of the marina entrance (approximately 50 per cent of the marina's total width). Being a well flushed system, any nutrients or contaminants suspended during dredging works are expected to be well diluted and therefore not likely to result in eutrophication or build-up of pollutants of this system. Stormwater runoff and operational practices in the marina would also be managed to ensure that adequate water quality is maintained in the marina basins.

[22] Australian and New Zealand Environment and Conservation Council 1997, *Code of practice for antifouling and in-water hull cleaning and maintenance : ANZECC strategy to protect the marine environment* viewed 12 September 2013, http://www.environment.gov.au/coasts/pollution/antifouling/code/pubs/code.pdf

5.2.4. Coordinator-General's conclusions – water quality

Based on the detail provided in the EIS I am confident that the proponent would implement best practice environmental management measure that support the achievement of the relevant water quality objectives for urban stormwater quality contained in the *Urban Stormwater Quality Planning Guidelines 2010*.

The investigations undertaken for the EIS provide an adequate assessment of the likely impacts associated with the proposed construction activities. However, a more detailed risk assessment of potential disturbance of ASS and PASS material will be required prior to the commencement of construction. I state conditions to ensure the excavation and placement of PASS is managed to ensure no untreated material is released to the environment.

With regards to ship-sourced pollutants, I note that the proponent will ensure that the final design of the proposed GCIMP is suitably designed to accommodate stormwater flows to avoid local flooding or adverse impacts on water quality within the marina basin and surrounding waters. I state conditions to ensure this outcome in Appendix 1.

To ensure protection of water quality, I state a condition to ensure that the development complies with a dredge management plan that demonstrates how environmental impacts will be managed and mitigated, and complies with requirements of the *National Assessment Guidelines for Dredging 2009.*

Careful management of marina operations would be required to minimise risks to the quality of the receiving waterways. I have conditioned the proponent to ensure that facilities for the reception and disposal of ship sourced pollutants are provided in accordance with the *Ship-sourced pollutants facilities in marinas development code*; particularly with regard to sewage, garbage and other waste (for example oily bilge water).

I also expect the proponent to construct and maintain stormwater treatment systems so that run-off from all hardstand areas is filtered prior to discharge into waterways.

Marine habitats

Wetland vegetation

Vegetation clearing and earthworks activities (filling and excavation) associated with the proposed development would be expected to result in the loss of 17.08 ha of estuarine wetland vegetation (including 1.24 ha of mangroves and 15.85 ha of salt marsh) and 3.48 ha of palustrine wetland.

The EIS indicated that the future construction of the IRTC would also result in an additional loss of 0.1 ha of mangroves and 0.78 ha of salt marsh. Construction of this corridor would also be expected to impact on central brackish wetlands by preventing tidal inundation to this area.

The EIS reported that the loss of 3.48 ha of the palustrine wetland would be offset through the rehabilitation works proposed within the open space areas of the project site, specifically within Lot 146 SP150731.

The EIS included a discussion on potential offsets for the unavoidable loss of 17.08 ha of estuarine wetland vegetation on the site. This discussion noted that there is limited availability for 'like for like' offsets in the local Gold Coast and Moreton Bay region. During the preparation of the EIS, the proponent investigated three offset options within the central Queensland region. The EIS concluded that the proposed options would need to be further investigated to determine their suitability.

In addition to potential land acquisition, the proponent has also considered a number of indirect offsets, including:

- financial contribution to fund the upgrade of the boardwalk and related facilities within the Tallebudgera FHA adjacent to the Fleay's Sanctuary to encourage greater use by the public and school groups
- financial contribution to fund $900,000 of repairs for the Coomera River tidal weir fish ladder
- financial contribution to fund an education facility at the broadwater parklands.

Seagrass

The Coomera River EPP requires that existing water quality parameters for TSS and turbidity are maintained to retain the local distribution and composition of seagrass. Modelling undertaken for the EIS indicated that the sediment plumes generated during dredging would be expected to exceed the existing water quality objectives for turbidity and TSS required to maintain seagrass and to protect the aquatic ecosystem values for the mid estuarine section of the Coomera River.

Using the known tolerance limits for seagrass as referenced in the EIS, the sediment plumes generated by capital dredging are expected to have the greatest impact on the seagrass beds at Foxwell Island and 800 m downstream where turbidity and TSS concentrations would be highest. Exceedances of turbidity and TSS limits may result in a total loss of up to 1.23 ha of seagrass.

The EIS reported that the losses would be expected to be temporary and the seagrass in these areas expected to recover to its former extent. The Coomera River EPP indicates that a minimum TSS concentration of less than 10mg/L would be required to restore seagrass. A recovery period of three to five years would be expected at the site at Foxwell Island and one to three years at the site downstream. The level of recovery would be dependent on the changes to the physical environment, increases in vessel traffic and the occurrence of major rainfall or flooding events.

The sediment plumes generated by the dredging works would also be expected to impact on benthic marine habitat through increased rates of sedimentation. Modelling indicated that the highest rates of sedimentation would be expected to occur within the main channel west of Foxwell Island.

Elevated turbidity levels and increased rates of sedimentation would also be expected to result in moderate changes to benthic fauna communities in the areas immediately adjacent to the disturbance footprint and in the lower reaches of Oakey Creek. These changes would be expected to be permanent as result of modified habitat structure (i.e. increased depth and decreased light penetration).

The sediment plumes generated during the capital works are not expected to have any measurable impact on seagrass further downstream and any impacts would be expected to be short term.

Maintenance dredging

Modelling indicated that the sediment plumes generated during maintenance dredging activities would impact on the seagrass beds at Foxwell Island. Other seagrass in the Coomera River is not expected to be adversely impacted by sediment plumes generated by maintenance dredging works.

Silt curtains would be used during maintenance dredging to control the migration of suspended sediments. These silt curtains would be installed using a boat/barge and would also be maintained frequently to ensure correct positioning and to keep the curtains free of debris.

The proponent is required to conduct water quality monitoring of the project area for at least 18 months prior to the commencement of capital dredging activities. The outcomes of the monitoring program would assist in updating water quality objectives and must be submitted to the administering authority in support of an application for development approval. The water quality monitoring program must be designed in accordance with the relevant guidelines.

The proponent has committed to undertake water quality monitoring during capital and maintenance dredging works to assess any impacts of turbid plumes. The proponent has also committed to implement adaptive management measures, including a risk-based water quality monitoring program, to ensure dredging operations are responsive to changes in water quality.

The proponent has committed to undertake seagrass surveys prior to the commencement of dredging operations. The information collected would be used to inform management of the impact of dredging activities and the extent of the seagrass impacted. The proponent has committed to develop an offset proposal to address the loss of seagrass associated with the proposed dredging operations.

5.2.5. Coordinator-General's conclusions – marine habitat

Capital and maintenance dredging works may potentially impact on seagrass beds at Foxwell Island and downstream from the site.

The highest concentration of suspended sediments is predicted to occur within the main channel of lower Oakey Creek and in the channel west of Foxwell Island. Sediment plumes generated during dredging works are expected to have the greatest impact on the seagrass beds identified on the western shore of Foxwell island and a site 800 m downstream on the Coomera river.

These impacts would be expected be temporary and the extent of sediment plumes generated by dredging works are to be minimised through staging and implementation of silt curtains.

Silt curtains would be used during dredging works to assist in preventing the migration of suspended sediments towards sensitive receptors. Water quality monitoring will be

undertaken in accordance with the construction management plan and water quality monitoring program before and during dredging works to assess any impacts of turbid plumes or contaminants associated with these plumes.

I require the following as part of the proposed development:

- Best practice dredge and construction management to minimise the generation of sediment plumes and avoid the incidence of elevated turbidity at sensitive sites
- Continuous monitoring of water quality at sensitive sites, including seagrass
- Regular monitoring of seagrass and mangroves in the vicinity of the development footprint during construction
- A dredge management plan that demonstrates how environmental impacts will be managed and mitigated, and complies with requirements of the *National Assessment Guidelines for Dredging 2009*[23].

Potential impacts on marine fauna

Increased vessel traffic

Construction of the external marina would lead to an increase in the number of vessels using the Coomera River, which may inevitably result in more frequent interactions between boating traffic and mega-fauna (e.g. turtles and dugong). Such interactions may increase the risk of boat strike.

The proposal includes a total of 390 marina berths and will generate an average of 69 boat trips per day. The proponent has considered the increase to be minor with respect to the current existing number of boats within the Gold Coast and Coomera River.

Existing marina developments in the Coomera River include Gold Coast City Marina, Hope Harbour Marina, Hope Island Resort Marina, Coomera Waters Marina, Sanctuary Cove Marina, River Links Marina which provide more than 1070 wet marina berths.

Surveys undertaken for the EIS in 2010 at three points in the Coomera River (Shipper Drive, Beattie Road and Paradise Point) recorded a total average of 1585 trips (over an average weekday, Saturday and Sunday).

The proponent has considered the risk of boat strike within the marina area to be low as the seagrass beds around Foxwell Island and downstream from the site are not considered to provide important foraging resources for dugong or turtles. Nevertheless, the proponent intends to minimise the risk of collisions with marine mega-fauna by concentrating traffic to the existing channels, implementation and enforcement of speed restrictions (6 knots) within the marina and entrance channels and educating the public on boat strike risks including signage at public boat ramps.

Construction activity

Pile driving, dredging operations and shipping activities associated with the proposed development may impact on marine fauna by exposing them to levels of underwater noise which may adversely affecting their behavioural patterns. Marine fauna species potentially occurring in the project area that would be considered most sensitive to

[23] *National Assessment Guidelines for Dredging*, Commonwealth of Australia, Canberra, 2009

underwater noise include dolphins, dugongs and marine turtles. Whilst there is a potential risk for marine fauna to be impacted by the proposed works, the proponent considered the risk of these impacts occurring to be low due to the low likelihood of these fauna occurring in the project area.

In response to the EIS, EHP recommended the proponent to implement a range of mitigation measures to reduce underwater noise impacts including the use of bubble curtains during piling driving operations.

The proponent noted that these impacts would be addressed as part of construction management measures which would be prepared through subsequent development applications.

Implementation of the silt curtains in the dredging areas during the construction of the marina may potentially cause aquatic fauna (e.g. fish, marine mammals or turtles) to become temporarily trapped within the excavation area.

The proponent has made a commitment to ensure that adequate measures are undertaken to reduce the likelihood of fauna becoming trapped during construction works. This would include the installation of silt curtains during low tide and conducting visual surveys to identify any fauna requiring removal prior to excavation works.

Introduction/spread of marine pests

The risk of introducing or spreading marine pests would be considered to be low, provided that debris and runoff from hull cleaning and maintenance activities is prevented from entering receiving waters and that adequate sewage and waste reception facilities are provided for vessels.

Any monitoring, prevention and mitigation approaches for invasive marine pests are developed in accordance with the *National System for Prevention and Management of Marine Pest Incursions; Australian Marine Pest Monitoring Manual* and *Australian Marine Pest Monitoring Guidelines*.

Benthic habitat areas

The EIS reported that the construction of the external marina would result in a direct loss of marine plants and soft-sediment benthic habitats (5.2 ha) within Oakey Creek and the Coomera River. This disturbance would be expected to cause a moderate change in benthic communities in the area immediately adjacent to the disturbance footprint.

Some soft-sediment benthic habitat and hard substrate habitat will be gained as a result of the development. Construction of the external and internal marinas is expected to provide an additional 11.5 ha of sub-tidal marine habitat.

The substrates associated with the marine structures including pontoons, piles and other inter-tidal and sub-tidal structures are likely to be colonised by a variety of flora and fauna that would consequently encourage a variety of fishes and other fauna to utilise these areas for food and shelter.

A ‘fish-friendly’ design would also be used in the construction of the revetment walls to increase available habitat for fish and invertebrates.

5.2.6. Coastal hazards

The Gold Coast City Council Climate Change Strategy 2009–2014[24] indicated that the sea level in the Gold Coast region may increase between 18 and 79 cm by the year 2100. Based on current survey data and predicted sea level rises in the next 50 and 100 years, the site is identified within the zone of current and predicted inundation.

Current coastal hazard area mapping indicates that a large proportion of the site is mapped as a 'high hazard' storm tide inundation area (i.e. inundation water depth greater than 1.0 m) and as an erosion prone area that would be subject to erosion and permanent tidal inundation by the highest astronomical tides by the year 2100.

The developable parts of the site including the dredge pond wall would be filled above 3.4 m AHD. This is approximately 2.4 m above the level of the highest astronomical tide and is considered to be sufficient to mitigate present and future storm tide risk.

It noted that 1 per cent AEP flood levels would be higher than the 1 per cent storm tide level.

5.2.7. Flooding

Context

Significant flooding events in the Coomera River are known to have occurred in 1967, 1974, 1976 and 1989[25]. Flood levels in the Coomera River are influenced by a combination of river flows and storm tide level (i.e. tide level + storm surge). Modelling of the 1 per cent AEP fluvial flow combined with the 1 per cent AEP storm tide indicated a flood level at the site ranging between 3.20 to 3.23 m AHD.

The EIS reported that the 1 per cent AEP flood level at the site may increase as much as 0.35 m as a result of sea level rise and increased rainfall intensity associated with future climate conditions.

The proposed development site is located within a defined flood area under the Gold Coast planning scheme. As a result of the site being located below the 1 per cent AEP flood level and at the confluence of the Coomera River and Oakey Creek the site is prone to flooding from both catchments.

Flood modelling indicated that peak flood levels occur across the site, when there is combined flooding in both Oakey Creek and the Coomera River. The site provides a lateral conveyance path for floodwaters and also provides temporary flood storage during periods of major flooding in the Coomera River.

Potential flooding impacts

The proposed partial filling of the site would be expected to have a localised impact on flooding by reducing available flood storage and the conveyance capacity of the Oakey Creek flood plain.

[24] Gold Coast City Council 2009, *Climate Change Strategy 2009–2014*, Gold Coast City Council 2009, viewed 14 May 2013, http://www.goldcoast.qld.gov.au/documents/bf/climate_strategy.pdf
[25] Middelmann, Harper and Lacey, Chapter 9 *Flood Risks*, Geoscience Australia viewed 22 May 2013, http://www.ga.gov.au/hazards/flood/reports.html

Approximately 65 per cent (40.50 ha) of the site would be filled above the 1 per cent AEP level (3.4 m above the AHD) with the remaining 35 per cent of the site left at the existing ground level to provide storage for flood waters. The loss of flood storage would be partially offset by widening the channel between the site and Foxwell Island by 65 m (inclusive of the external marina) and deepening the channel to –4.0 m to increase the flood conveyance capacity of the Coomera River.

Hydraulic modelling undertaken for the EIS indicated that the proposed development would generally result in minor changes to flood levels in the immediate area with maximum increases typically less than 0.01 m. The exception would be upstream from the site on Oakey Creek where flood levels would be expected to increase by up to 0.044 m during 1 per cent AEP regional catchment flooding events.

In response to a request from GCCC concerning local catchment flood events in Oakey Creek additional modelling indicated that flood levels would be expected to increase by 0.081 m on private properties near the intersection of the Shipper Drive with Oakey Creek during 100 ARI local catchment flooding events. The proponent indicated that the resulting local catchment flood level (2.48 m) is 0.86 m lower than the regional catchment flood level (3.34 m) and concluded that additional flooding in Oakey Creek would not be expected to worsen the designated 1 per cent AEP flood level.

The proponent also advised that the flood level increases in this area would not impact on private property as the area of land impacted is designated as *Open space – Oakey Creek Environmental Park* under the GCPS. The EIS indicated that a small number of private properties in the local catchment would not be affected by flooding as these properties are located on steeply sloped land above the flood level.

The EIS identified 11 properties that could be affected in events up to the one per cent AEP. The proponent indicated that the increase in the flood level in these areas would be small (10 to 20 millimetres) and that the probability of material damage occurring is rare, ranging from 1 in 300 to 1 in 4 000 in any given year.

The GCCC requested hydraulic modelling was undertaken by the proponent without inclusion of the IRTC. Comparison of the modelling data (i.e. with and without inclusion of the IRTC) concluded that inclusion of the IRTC would not significantly alter impacts expected from the proposed development.

DTMR (Roads, Rail and Ports System Management Branch) raised concern about the resulting flood levels associated with the proposed development on the integrity of the existing railway infrastructure within the Oakey Creek floodplain.

In response to concerns raised by DTMR, the proponent advised that there would be no impact as the existing infrastructure would be above the expected flood levels. The proponent considers that given the rail embankment is located 1 m above the 1 per cent AEP flood level (3.3. AHD) an increase in flood levels up to 0.044 m would not be expected to result in overtopping of the rail in this area. It was also indicated that the proposed development would not be expected to significantly increase the duration of inundation at the ground level where rail cabling may be located as the duration would only be expected to increase by 20 to 30 minutes.

Further discussion was also given to the potential impacts that may be associated increased flow rates and velocities on the bridges/culverts around the rail line. The proponent indicated that the modelling undertaken for the EIS demonstrated no change and potentially a small decrease in the velocity and flow rate around the rail line.

Stormwater quantity

Hydrological investigations were undertaken to identify how the proposed development would impact on peak stormwater flows across the site. Investigations included an assessment of the site in its existing condition, developed condition, and developed condition with mitigation measures (e.g. stormwater detention structures). Assessment of these conditions indicated that the proposed development would have an impact on peak discharge flow rates to Oakey Creek and the Coomera River catchments as a result of an increase in impervious surfaces associated with the construction of buildings and hardstand areas.

It is not expected that an increase in peak discharge flow rates would have a significant regional impact on the Coomera River due to the large size of the catchment. Oakey Creek in contrast, would be expected to be more greatly affected by the increase in peak discharge flow rates due to the smaller size of the catchment. An increase in peak flow rates without mitigation would be expected to cause a rise in water levels within the creek.

The proponent has made a commitment to implement best practice stormwater management practices and design elements to ensure that runoff is adequately managed to protect the water quality of the receiving environment.

Stormwater detention structures are proposed in each of the catchments to ensure that peak stormwater discharge is not increased at any of the discharge locations as a result of the proposed development. Rainwater harvesting tanks are also proposed, to capture rainwater runoff from roof surfaces as a measure to attenuate peak stormwater flows and to supply water for boat washing, hardstand wash down, irrigation and toilet flushing. It is anticipated that more than 3 ML of rainwater would be captured annually.

Modelling has been conducted to demonstrate the effectiveness of the proposed mitigation techniques, including stormwater detention structures. Preliminary hydrological investigations indicated that the proposed stormwater detention devices would be effective in mitigating increased flow rates resulting from the development.

Stormwater management systems would be implemented to avoid adverse impacts on adjoining land including the IRTC.

5.2.8. Coordinator-General's conclusions – flooding and stormwater

Flooding

The EIS documentation includes a floodplain management report that addresses the requirements of the Council's Planning Scheme *Constraint Code for Flood Affected Areas*.

The development of the site is expected to impact on the flooding regime of Oakey Creek by reducing available flood storage and the conveyance capacity for flood waters. Such impacts may include an increase in peak flow velocities and water levels in Oakey Creek. These impacts are partially mitigated by the dredging works in the Coomera River.

It was indicated that 11 properties may be subject to material damage under limited and specific flooding events. The probability of an event occurring that may result in a claim for actionable nuisance is assessed as low and ranging from 1 in 300 to 1 in 4000 in any given year.

The EIS has presented enough evidence to conclude that any impacts to rail infrastructure as a result of the proposed development would be negligible.

I require the following as part of the proposed development:

- submission of the flood plain management information to GCCC as part of an application for development approval
- development to be designed and constructed so that it is filled no more than 65 per cent of the site to avoid unacceptable loss of floodplain storage
- hazardous materials are stored in locations that provide flood immunity
- essential services infrastructure is either:
  - located above the defined flood event
  - designed and constructed to exclude floodwater intrusion/infiltration
  - designed and constructed to resist hydrostatic forces as a result of inundation by the appropriate flood immunity level
  - the proposed development will maintain the safety of people on the development site from all floods up to and including the defined flood event.

Stormwater

The hydrological assessment conducted for the EIS indicated that the stormwater detention devices proposed for the project would be sufficient in providing control measures to mitigate increased flow rates resulting from the development and ensure the protection of the receiving environment and adjoining land from the effects of stormwater runoff increase.

I state conditions in this report to ensure that the proposed development does not cause an increase to peak discharging flow rates for any design storm at each of the designated discharge locations.

5.2.9. Bank erosion

Context

The EIS indicated that there is significant bank erosion in most tidal sections of the Coomera River, particularly around Foxwell Island and the southern and northern banks of the Coomera River upstream, downstream and opposite the Santa Barbara boat ramp.

Tidal and flood hydraulics and associated sediment transport, are identified as the major physical processes that shape and contribute to bank erosion in the Coomera River. The EIS notes that past canal developments, dredging and development works in the lower sections of the river are also considered to have contributed to bank erosion.

Potential bank erosion impacts

The proposed construction of the external marina is expected to cause an increase in flow velocities in Oakey Creek from 0.30 m/s to approximately 0.47 m/s during spring tides. These increases would be expected to cause minor localised scouring of the creek bed and banks, particularly in areas where bare soils are exposed. However increased velocities in this area are not expected to have a significant impact on bank erosion processes in the Coomera River.

In its response to the EIS, EHP raised concern about the potential impacts of the development on bank stability within the section of Oakey Creek between Foxwell Island and Lot 1 on SP150729 directly north of the site.

Lot 1 on SP150729 is intended to be surrendered to the state for conservation purposes as part of another proposed development and is also identified as being in an erosion prone area. EHP commented that the potential for scour suggested by modelling indicates that bank stability could become an issue for the future of this reserve.

EHP recommended that the proponent quantify the erosion risk for the banks of Oakey Creek of Lot 1 on SP150729 and Foxwell Island and to provide information on the preferred strategy for mitigating erosion.

A number of options were investigated to determine suitable mitigation measures to reduce peak flow velocities such as sand filled geo-textile bags through the channel. Other factors associated with the development that may impact on bank erosion include the increased number of vessels which may contribute to erosion through the generation of boat wash. The proponent considered these impacts to be negligible, given the large number of vessels already using the area, relative to the small increase in vessels and the range of other factors that contribute to bank erosion processes in the Coomera River. The area between the existing marine precinct and Sanctuary Cove is considered to be most vulnerable to erosion impacts and efforts to protect infrastructure and building would need to be concentrated in this area.

5.2.10. Coordinator-General's conclusions

I require the proponent to undertake investigations during the detailed design phase of the proposal to determine the vegetation and bank condition of the northern bank and to accurately define the risk of erosion. The information obtained from these investigations would be used to determine where the fill extent would need to be reshaped and/or adjusted to minimise the impact of bank erosion resulting from the development.

I require the proponent to commit to undertake routine monitoring post-development to assess if there is any significant bank erosion and to investigate the need to implement

constriction and bank stabilisation measures, in the event that bank erosion is identified. Stabilisation measures will need to be approved by GCCC.

5.2.11. Introduction/spread of weeds and pest animals

Weed management

Weed invasion can result in the degradation of habitat by reducing the potential use of the habitat by fauna (e.g. for activities such as foraging, roosting and/or nesting) and the potential for fauna movement by removing habitat connectivity.

Weeds and weed seed have the potential to be carried in construction materials such as sand, soils and mulch and may also be spread from one location to another by construction machinery. Construction materials may also contain flora pathogens that pose a risk to native flora. Weeds may also be spread by increasing the potential for their germination and establishment by improving conditions that favour these species.

The proponent has committed to develop a weed management strategy to manage the potential introduction and spread of weeds and flora pathogens.

Pest management

The use of construction machinery and import of building and construction materials to the site has the potential to introduce pest animals such as fire and crazy yellow ants and cane toads. Terrestrial animal pests may impact on native fauna by disruption to the natural environment and through predation or competition. Pest animals such as fire ants can also have significant social and economic impacts.

In response to the EIS, DAFF recommended that the proponent provide detail on what strategies would be implemented to prevent the introduction of pest animal and weed species and to manage the spread of existing pest animals and weeds.

The proponent stated that these risks would be managed in accordance with a pest management plan. The proponent has committed to update the construction EMP (Element 8) prior to the commencement of OPW (change to ground level application) to include the actions and strategies that would be undertaken to prevent the introduction and spread of pest animals.

Increase in human activity and noise

The proponent is to prepare management plans to manage potential impacts associated with increased human activities and noise during the operation of the project. Refer also to Section 5.4 for more details on noise impacts and mitigation.

5.2.12. Coordinator-General's conclusions

I require the following as part of the proposed development:

- all developments must be set back from ecologically significant areas, with buffers of dimensions and characteristics that will ensure that the development does not result in a negative impact on the long-term viability of ecologically significant areas

- riparian buffers of sufficient width to maintain bank stability and existing water quality, maintain aquatic and wildlife habitats and movement corridors for native animals
- the buffer is maintained free of pest animals and weeds.

5.3. Air quality

5.3.1. Context

The proposed development is located within a marine industrial area. There a number of boat manufacturing industrial sites located to the south of the proposed development along Waterways Drive. There are small residential and acreage allotments to the south west and to the north of the site across Oakey Creek and residential suburbs to the east of the site across the Coomera River. The EIS indicated that the air quality of the local area is often compromised by suspended particles generated by dust storm and bushfire events.

Assessment methodology

Ambient air quality data was sourced from the nearest air monitoring station at Springwood to provide an indication of the likely regional air quality for particulate matter (PM), sulphur dioxide, benzene, toluene and p-xylene emissions. This data is considered suitable by the proponent as the area has a similar mixture of light industry and residential land uses to those at the Coomera site. Additional ambient air quality data for carbon dioxide was sourced from a monitoring station in Woolloongabba and styrene data was sourced from the Coomera area in 2007.

Air quality data for existing sources of styrene was sourced from existing boat and yacht manufacturing facilities near the site. Data on nitrous oxides, carbon monoxide and PM generated by motor vehicles and boating have been sourced from Air emissions inventory South-east Queensland[26].

Dispersion modelling was undertaken to determine the predicted maximum concentrations for PM, carbon monoxide, nitrogen dioxide and styrene at the nearest sensitive receptors under typical and worst case conditions for the existing and developed case scenarios. The scenarios considered the types of emissions generated by marine and associated industry activities for the fully developed case based on monitoring data.

5.3.2. Construction

The EIS indicated that construction works would involve a number of activities that have the potential to generate dust and gas emissions and odours. Construction activities most likely to generate dust include earthworks, excavations, clearing vegetation and soil stripping. Dust generation would be minimised by watering down working areas, haul routes and soils stockpiles, and by regularly maintaining and

[26] EPA and BCC, 2004. *Air emissions inventory: South-east Queensland region*. Report prepared by a partnership between Brisbane City Council and the Environmental Protection Agency, Brisbane

servicing equipment and plant being used within the site. Dust emissions would also be controlled through the use of wind-break nets at the edge of exposed areas to minimise the impacts of dust at local residences. The EIS indicated that dust emissions would be expected to be less than the ambient PM10 values derived from the nearest air monitoring station, provided that working areas are adequately watered down. Dust emissions generated during construction would therefore not be expected to cause a nuisance to the nearest sensitive receptor.

The EIS reported that engine combustion gases generated by plant and equipment during construction would be 20 per cent less than the ambient values derived from the nearest air monitoring station and would therefore be expected to meet air quality objectives to protect health and wellbeing.

Odours generated during dredging activities are expected to be minimal as dredged material would be kept wet and treated for acid drainage to minimise odours associated with the storage of the material.

5.3.3. Operational impacts

The EIS indicated that operational emissions would include styrene from boat manufacturing processes and particulates and gases (e.g. PM_{10}, CO_2 and NO_x) and from increased road and waterway traffic generated by the completed development.

Styrene

The EIS indicated that styrene emissions are generated by the existing businesses in the GCMP, including Maritimo Offshore, Riviera Marine, and smaller boat builders. The operational activities proposed in the GCIMP include boat manufacturing and repairing in the southern precinct. The tavern proposed in the north east corner of the site would be the nearest sensitive receptor when the GCIMP is operational.

Styrene is a hazardous chemical used extensively by the marine industry for boat building and repairing. Styrene emissions can be hazardous to human health and can also be a nuisance in terms of odour. Based on the air quality objectives for styrene stated in Schedule 1 of the Environmental Protection (Air) Policy 2008 the required concentration to protect health and wellbeing is an average of 280µg/m^3 over a one week period. The required concentration to protect the aesthetic environment is an average of 75 µg/m^3 over a 30 minute period.

The modelled existing maximum average styrene concentration of 25 µg/m^3 over a one week period is well below the criteria required to protect health and wellbeing. Modelling undertaken for the EIS predicted that under the worst case scenario existing styrene concentrations would exceed the amenity criterion at the nearest affected receptor reaching 134 µg/m^3. Whilst this value exceeds the amenity criterion, this concentration is not expected to cause a nuisance as the value correlates to two odour units. Odour units are measured on a seven point scale with 0 being 'not detectable' and 6 being 'extremely strong'. The upper odour threshold for styrene is approximately 800 µg/m^3.

Modelling undertaken to predict styrene emissions from the proposed development indicated that the highest predicted 30 minute styrene concentration is 62 µg/m^3. This

concentration meets the air quality objective to protect the aesthetic environment and is therefore not expected to cause a nuisance at any odour sensitive place.

The highest predicted styrene concentration over a one week period is 11µg/m^3 which is well below the required criteria required to protect health and wellbeing, which is therefore considered unlikely to impact on human health. This modelling assumed mitigation strategies would be in place, such as 6 m stacks and carbon filters with 90 per cent removal efficiency would be installed on the new styrene bays in the development, and transfer to the GCIMP of the existing Maritimo bays, which would also incorporate the mitigation strategies. The modelling therefore indicates that styrene emissions could be adequately managed.

Particulates and engine gas emissions

Modelling indicated that under worst case scenario particulates and engine gas emissions (CO, PM10 and NOx) generated during operation would be well below the air quality objectives stated in Schedule 1 of the Environmental Protection (Air) Policy 2008 to protect health and wellbeing and amenity.

The strategic review of the GCIMP prepared by Giles Consulting International and Urban Systems for the EIS indicated that airborne dust and particles generated from the dredge material treatment facility may pose a risk to fibreglass resin and painting operations within the adjoining precinct. I state conditions in this report, requiring the proponent to ensure that measures are undertaken to minimise the release of emissions of dust and/or particulate matter to reduce effects on boat building activities.

5.3.4. Mitigation measures

The proponent has made a commitment to undertake a detailed assessment of air quality impacts, once more details about land uses in the GCIMP are known. This assessment would follow detailed design and would be provided for assessment by GCCC at the DA phase. The application would include an amended site based operations plan to reflect this detail and to outline suitable mitigation measures.

5.3.5. Coordinator-General's conclusions

I note that future air quality assessments submitted with DAs would contain:

- plan details of all buildings housing styrene-emitting activities, and specific control measures (including required stack heights) to ensure the air quality goals for all nearest sensitive receptors are achieved
- updated modelling for the current proposed master plan.

I note that in these future applications, the proponent would be required to provide adequate detail to demonstrate that air quality control would be effective in achieving air quality objectives stated within the Environmental Protection (Air) Policy 2008. I also note that the proponent made a commitment to provide details of an updated assessment of air quality impacts and air quality control measures as part of the subsequent development applications for ERA 49 (Boat maintenance and repair).

I am confident that the proponent has incorporated the appropriate measures into the development code to ensure that cumulative air quality impacts generated from the GCIMP would be considered and assessed, allowing the development to operate within the parameters set by the Environmental Protection (Air) Policy 2008.

5.4. Noise and vibration impacts

5.4.1. Existing environment

The land on which the proposed GCIMP site is located has been designated as marine industry since the late 1990s and GCCC has implemented policies to protect the integrity of the precinct, such as separating the marine industry activities from nearby sensitive land uses.

There are a number of activities surrounding the development site that contribute to noise in the local area, such as:

- traffic along Foxwell and Beattie Roads
- boating activities in the Coomera River
- marine industry activities in the existing marine precinct, including forklift and vehicle movements around the site (including reversing alarms), ship lift operational noise, mechanical plant (including air-conditioners, exhaust fans and air intakes) and boat building and maintenance activities.

5.4.2. Construction

The EIS notes that the construction stage of the project would involve a range of works that are likely to generate a high level of noise, including bulk earthworks and piling. Construction plant including excavators, graders and dozers would be expected to contribute to the overall noise levels generated during construction. Haulage traffic associated with delivering fill to the site would also be expected to generate noise impacts along the haulage route along Foxwell Road and Shipper Drive. Construction activities would also be expected to generate vibration.

The EIS provides an indication of the likely sources of noise impacts and the receivers likely to be affected. The EIS notes that following detailed design of the GCIMP, noise and vibration impacts associated with construction would be assessed in detail when the particulars of plant and equipment are known for each phase of work.

Proposed mitigation strategies

The EIS notes that due to the potential for the project construction to exceed defined noise and vibration criteria, control measures would be required to attenuate noise level and vibration impacts on affected receivers. The EIS reported that noise control measures based on Australian standard AS2436 (noise control measures for building sites) would be implemented during construction. The EIS indicated that such noise attenuation treatment measures may reduce noise emission levels of specific plant items by approximately 5 to 10 decibels (dB)(A). This can be considered satisfactory to

control noise emissions to comply with acoustic criteria for daytime and potentially evening periods.

Noise and vibration impacts would be managed in accordance with a construction noise and vibration management plan. The management plan would also detail any noise and vibration monitoring that would be undertaken during construction.

The EIS reported that community consultation would also be undertaken with potentially affected receivers. Affected receivers would be provided with details of the construction plan and any planned activities that may exceed noise and vibration activities.

Construction activities would be limited to less noise sensitive periods, within the time periods specified in the Gold Coast Planning Scheme (Part 7, Division 2, Chapter 11). Should construction works be required outside of these times the EIS notes that a separate application to GCCC would be required.

5.4.3. Operation

The EIS assessed the likely noise levels of the project by extrapolating noise levels from activities conducted in the existing marine precinct.

Like the adjoining GCMP, the operation of the proposed GCIMP is expected to include a range of activities that have the potential to generate high levels of noise, particularly ship-lift operations and marine industry activities associated with boat manufacturing and maintenance. The EIS indicated that residences at Hope Island to the east of the development would be most affected by any noise generated by ship-lift operations. Sensitive receivers within the GCIMP precinct that would be most susceptible to noise impacts include the short-term accommodation building, office spaces and meeting rooms.

Mitigation measures

Acoustic treatment measures are proposed to reduce operational noise impacts. Noise control measures include limiting industrial activities within sheds, providing proprietary acoustic enclosures for any outdoor works, and limiting industrial activities to less noise-sensitive periods (for example, daytime and early evening periods).

The proponent has made a commitment to undertake a detailed assessment of noise impacts and noise attenuation measures, once more details about land uses in the GCIMP are known. This assessment would occur following detailed design and would be provided for assessment at the DA phase. The application would include an amended site-based operations plan to reflect this detail and would provide more detail on suitable mitigation measures.

The GCIMP development code also provides a range of measures to ensure that future development on the site appropriately takes into consideration noise and vibration impacts on neighbouring sensitive receptors. For example:

> To achieve the ongoing minimisation of environmental harm resulting from the development, all facilities/buildings/structures at which activities will be carried out, must be designed to permit the activity to be carried out in accordance with best practice environmental management (as defined in the *Environmental Protection Act 1994*).

The development code also requires that:

> Potentially obtrusive noise, odour and visual impacts are effectively buffered. Examples of mitigation treatment include: landscape buffers, earth mounds, acoustic treatments and acoustic fencing.

To ensure that cumulative effects of any future developments are appropriately considered, the development code also requires that:

> The proposed use must not adversely detract from the existing amenity of the local area and it must also take into account and seek to ameliorate any negative aspects of the existing amenity on the local area, having regard to but not limited to the impact of:
>
> - noise
> - hours of operation
> - traffic
> - lighting
> - signage
> - visual amenity
> - privacy
> - odour and emissions.

5.4.4. Coordinator-General's conclusions

The proponent has incorporated appropriate measures into the development code to ensure that the cumulative impacts of noise and vibration generated from the GCIMP would be considered and assessed, allowing the development to operate within the parameters set by the Environmental Protection (Noise) Policy 2008 (EPP (Noise)).

I note that as part of applications for development approval, each proponent would be required to provide adequate detail to demonstrate that noise attenuation and control measures would be effective in achieving acoustic quality objectives stated within EPP (Noise).

5.5. Waste

5.5.1. Issues

The proposed development is likely to generate waste during both construction and operations, including general and regulated wastes. The EIS identified the types of waste likely to be generated by the proposed development in the Waste Management Plan, Appendix 12, Volume 5.

Construction waste

Waste generated by the construction of the project would be managed in accordance with best practice waste management practices, the requirements of the Environmental Protection (Waste Management) Policy 2000 (EPP (Waste)) and GCCC's Solid Waste Management Policy for New Developments 2011.

All waste generated at the site during construction is proposed to be stored in a designated area for collection by approved waste contractors and transported for treatment or disposal off site.

Storage of hazardous wastes, such as waste oils, batteries and chemicals, would be in a bunded designated hazardous waste area with an appropriately designed stormwater collection system to ensure that any runoff is minimised or leaks are captured.

The collection and disposal of regulated wastes would be conducted in accordance with the relevant environmental regulatory requirements as well as the segregation requirements based on the Australian Dangerous Goods classifications where relevant to ensure that these wastes do not cause environmental harm.

Operations waste

The proponent has made a commitment to provide further detail regarding the management (collection, treatment, storage, removal and disposal) of wastes generated from ship building and maintenance/repair and marina operations through subsequent development applications for ERA 49—boat maintenance or repair.

A site waste control plan would be developed to manage the collection, storage, handling and removal of all litter and waste within the site in accordance with the *Environmental Protection Act 1994* and the EPP (Waste). The final waste management plan for the project would implement a waste tracking system for all regulated wastes.

The proponent's draft site-based management plan provided in the EIS gives a number of strategies to ensure no unintentional or unmanaged release of waste into the environment—for example, contracts for marina berths and moorings would require a nil bilge water release policy from vessels.

Sewerage

Sewage would be disposed via connections to the sewer main. As discussed under section 2.2.4 of this report (Infrastructure requirements) the development proposes to utilise an on-site pump station and rising main along Shipper Drive that would connect to the Amity Way gravity line via an alignment under the proposed allotments to the north of the GCIMP.

Marina berths are to provide a sewer connection and an oil separating facility. Sewage reception facilities are to be provided to collect sewage waste from vessels. Wastewater from these reception facilities would be treated at the Gold Coast sewage treatment facility.

The proponent would be required to obtain a trade waste approval to allow discharge from wastewater from the proposed oil and grit separators within the Gold Coast

International Marine Precinct to the sewer. The approved trade waste would be discharged via a separate line to the domestic water discharge line.

GCCC stated that the Waste Management Plan submitted with the EIS has provided sufficient technical details to demonstrate that the proposal meets the waste management requirements.

5.5.2. Coordinator-General's conclusions

I note GCCC's comments on the EIS, particularly that the proposed waste management plan contains sufficient technical details to demonstrate that the proposal meets the relevant waste management requirements. To ensure that waste is appropriately managed, I require that future waste management plans submitted with DAs contain details of the solid waste management facilities and servicing arrangements for all components of the development. The information must indicate the proposal's compliance with Council's *Solid Waste Management Guideline for New Developments* (2011). Implementation of the requirements of the EPP (Waste) and GCCC's S*olid Waste Management Policy for New Developments* (2011) would ensure the proposed GCIMP manages waste from project activities, including construction and operations, in an appropriate manner. I consider that the assessment and management strategy provided in the EIS demonstrates the proponent's commitment to manage and dispose of waste responsibly and in line with best practice environmental management.

5.6. Social impacts

Located in the South East Queensland region and approximately 80 km south of the Brisbane, the Gold Coast is the second most populous city in Queensland. As at 30 June 2012, the estimated resident population of the Gold Coast was 526 173 persons, accounting for approximately 11 per cent of Queensland's population.[27]

Coomera is located in the northern part of the Gold Coast and is identified as an 'enterprise employment area' in the South East Queensland Regional Plan (2009–2031). The plan also notes that the marine industry's economic and employment growth will continue through an expansion of the marine precinct at Coomera.[28]

The Gold Coast Planning Scheme (GCPS) was adopted in January 2003 and replaced the Albert Shire Planning Scheme 1998. At the strategic level, the GCPS facilitates the expansion of the designated 250 ha marine industry precinct at Coomera, which was first designated as marine industry in the Albert Shire Planning Scheme 1998.

The marine industry is identified in the GCPS as an economic sector which has future prospects for the local economic growth of the city. The GCPS also includes a number of local strategies for the marine industry at Coomera which seek to protect the precinct from the encroachment of incompatible land uses.

[27] State Government Statistician, Queensland Regional Profiles: *Resident Profile – people who live in the region: Gold Coast City Local Government Area (LGA)*, Queensland Treasury and Trade, Brisbane, 2013, http://www.oesr.qld.gov.au, viewed 25 November 2013.
[28] Department of State Development, Infrastructure and Planning, *South East Queensland Regional Plan 2009 – 2031*, http://www.dsdip.qld.gov.au/resources/plan/seq/regional-plan-2009/seq-regional-plan-2009.pdf, viewed 1 November 2013

5.6.1. Community consultation

The community consultation program for the GCIMP which occurred prior to the submission of the EIS was conducted with a wide range of participants including:

- local residents
- Gold Coast businesses
- users of William Guise Foxwell Park
- boat and recreational users of the Coomera River
- Local, State and Federal elected representatives
- community interest groups
- business interest groups
- environmental interest groups.

A number of community consultation and engagement tools and activities were utilised during the consultation program such as one-on-one information sessions with interested parties on site, at the Sanctuary Cove International Boat Show and at the Coomera rail station. Private meetings, telephone and email communication was used to maintain contact with interested parties during the EIS process.

In addition to the directly consulted stakeholders, the project's website provided the general public with an avenue to review project information and provide feedback.

The EIS reports that generally local residents, business and other stakeholders felt that the project was a suitable development of the subject site and would bring benefits to the Gold Coast economy and marine industries. Some concerns regarding the impact of the project on residential amenity were raised and the proponent has incorporated strategies to mitigate negative impacts on residents in the GCIMP development code, which is discussed in section 5.8.3.

5.6.2. Loss of parkland

The Hinterland Model Flying Club (the club) would be directly impacted as a result of the project given its location within the William Guise Foxwell park. The club commenced flying from this location prior to the development of the marine precinct and neighbouring residential uses, and has continued to do so for approximately 17 years. With the development of the surrounding area, the club has had to realign its flight paths to abide by the Civil Aviation Safety Authority regulations, which do not allow the club to operate models over roads, buildings, vehicles or people. The proposed project would result in the club being unable to utilise the park when construction commences.

The EIS reported that the club has been working with the GCCC for the past 10 years to relocate its premises. Discussions between the club secretary and its members, and the consultation team indicate that it is generally supportive of the proposed development, especially if an alternative location can be found for the club.

The proponent was contacted by the club president during the public notification period for the EIS regarding the progress of the development. The proponent has committed to ongoing engagement with this stakeholder as the project progresses; and to use its

best endeavours to assist GCCC and the club to find an alternative location for its activities.

5.6.3. Education and training

During the early stages of developing the concept for the GCIMP, the proponent had discussions with the Institute Director of the Coomera TAFE regarding the potential to provide a marine industry trade training facility at the GCIMP. As a result of this consultation, the proponent provided for 1.6 ha of land for a TAFE in the GCIMP master plan.

The Department of Education, Training and Employment's submission on the EIS advised that the department no longer supported the provision of a TAFE at the GCIMP. The proponent has therefore removed the TAFE land-use designation from the master plan. However, the proponent recognises that for the marine industry to grow in the future, the training of quality employees is essential. Therefore, the proponent has incorporated an education land use into the GCIMP development code, which would allow for the inclusion of a training facility in the GCIMP should it be needed.

5.6.4. Native title and Indigenous cultural heritage

Native title

Submissions on the EIS requested further detail in relation to the tenure history of the site with respect to native title. Particular reference was made to the matter of native title rights and interests extending to all land and waters associated with the project.

As part of the amendments made to the preferred master plan in response to comments on the EIS, 16 marina berths have been removed from the external marina. This would ensure that the proposal is contained wholly within allotments where native title has been extinguished.

Indigenous cultural heritage

The Cultural Heritage Assessment report[29] recognised the Kombumerri clans as the culturally appropriate caretakers for the area as advised by the former Department of Natural Resources and Water.

Since the preparation of the EIS cultural heritage report, a native title claim has been lodged and it has been identified the project falls within the claim area. As such, Jabree Limited is the registered Aboriginal Cultural Heritage Body for the project area. Therefore, a revised cultural heritage assessment was submitted as part of the additional information to the EIS.

On 1 November 2012, the proponent issued to Jabree Limited written notice of its intention to develop a cultural heritage management plan (CHMP). Jabree Limited forwarded a fee proposal to Planit Consulting on 25 February 2013 to conduct a desktop assessment of the site and develop a CHMP under Part 7 of the *Aboriginal Cultural Heritage Act 2003* (ACH Act).

[29] EIS, vol. 10, App. 38

The report assessed the Aboriginal cultural heritage significance of the GCIMP site based on:

- a desktop review of Aboriginal cultural heritage databases
- a desktop review of relevant cultural heritage and environmental reports
- proposed disturbance to the site.

The traditional owners consider the site of the proposed GCIMP to be of high Aboriginal cultural significance. This is evidenced by the high number of cultural heritage sites located within a five-kilometre radius of the project site. In total, the DATSIMA Indigenous cultural heritage database identified a total of 31 sites.

Construction impacts

To manage the impacts of construction of the project on Aboriginal cultural heritage, the proponent proposes that suitably qualified people, nominated by Jabree Limited, would conduct a cultural heritage induction for all site workers. This will ensure that construction workers are aware of the cultural heritage significance of the area, and their obligations and duties under the ACH Act.

Should Aboriginal cultural heritage be encountered during construction, procedures would be implemented to ensure that work would immediately cease within a 25-metre radius around the Aboriginal cultural heritage site. The project's site supervisor would immediately inform a Jabree Limited representative who would determine the most appropriate means to manage the find, in consultation with the proponent.

The proponent has committed to store any salvaged cultural heritage objects located during construction, in a manner that is suitable to the traditional owners. The proponent would allow the traditional owners reasonable and adequate time required for any scientific or other examination of the objects.

5.6.5. Coordinator-General's conclusions

I consider that the social impact assessment provided in the EIS and the additional information to the EIS, was sufficient to allow detailed consideration of the social impacts.

In reviewing the information provided in the EIS, along with the submissions received during the public notification periods, I conclude that the project aligns with the strategic intent of the GCPS planning scheme, which identifies Coomera as a desirable location for marine industry development.

To enable the Gold Coast community to maximise the social benefits from the development of the proposed GCIMP, I encourage the proponent to develop strategies for employing:

- a local workforce
- members of vulnerable and disadvantaged groups, including Indigenous people, people with a disability, women and people from 'non-English speaking backgrounds'.

I consider that the proponent's commitment to assist the Hinterland Model Flying Club to find an alternative location for its activities is appropriate and I recommend that GCCC continue to work with the club and the proponent to achieve this outcome.

I note the proponent's commitment to provide opportunities for marine industry training and future employment opportunities for trainees at the GCIMP. This is an approach I support as it will provide long-term social and economic benefits for employment on the Gold Coast.

Based on the evidence presented in the cultural heritage report (presented as part of the additional information to the EIS), I consider it likely that Aboriginal cultural heritage sites may be identified on the project site when land is disturbed during construction. I note that the proponent has submitted a draft CHMP with the additional information to the EIS, which includes mitigation strategies to ensure that any cultural heritage finds at the GCIMP during construction are protected and I am confident that proponent will implement the necessary measures to ensure this outcome. I consider that the proponent's commitment to continue engaging with the Gold Coast Native Title Group provides further assurance that Aboriginal cultural heritage will be managed to the satisfaction of the traditional owners.

5.7. Economic impacts

5.7.1. Existing economy

The Gold Coast has had an average population growth of 2.63 per cent since 2007—slightly higher than Queensland's population growth of 2.2 per cent. The current unemployment rate on the Gold Coast is 5.6 per cent, which is marginally less that the Queensland rate of 6 per cent.[30]

It is reported that Queensland's marine industry generates $2 billion each year in direct revenue for the state's economy and employs over 7 000 people;[31] and the Gold Coast is Australia's largest recreational boat building industry, with an estimated turnover of $330 m and more than 450 marine companies.[32]

Traditionally, the Gold Coast economy has been underpinned by the tourism and construction industries, making the economy more susceptible to the ramifications of economic shocks such as the GFC.

Boat registrations

GCWA reports that recreational boat registrations on the Gold Coast are now close to 28 000 and almost 700 commercially registered vessels in the Gold Coast area.[33] The

[30] State Government Statistician, *Queensland Regional Profiles: Resident Profile – people who live in the region: Gold Coast City Local Government Area (LGA)*, Queensland Treasury and Trade, Brisbane, 2013, http://**www.oesr.qld.gov.au**, viewed 25 November 2013

[31] Queensland Government, Business and industry portal, *Investing in Queensland's marine industry*, Queensland Government, Brisbane, 2013, http://www.business.qld.gov.au/invest/investing-queenslands-industries/investing-qld-marine-industry, viewed 2 December 2014

[32] Gold Coast Tourism, Key Industries, http://www.visitgoldcoast.com/about-the-gold-coast/key-industries, viewed 13 November 2013.

[33] Gold Coast Waterways Authority, *Draft Waterways Management Strategy 2013–2023*, Gold Coast Waterways Authority, Main Beach, Queensland, 2013, viewed 2 December 2013, http://www.gcwa.qld.gov.au/userfiles/resources/static/GCWA-Strategy-Document.pdf.

Gold Coast LGA has the largest number of boat registrations in any Queensland LGA.[34]

Whilst demand levels have not returned to those pre-GFC, there is evidence demand is increasing. Data from Marine Queensland shows that new boat registrations on the Gold Coast continued to rise even during the GFC in 2008[35] as boat registrations tend to increase with population growth.

Continued increases in the number of boat registrations is a positive sign for the marine industry and also indicates that flow-on maintenance work would also be available.

Manufacturing and exporting

It is widely acknowledged that the Gold Coast is a leader in the manufacture of marine craft and that a large majority of all leisure boats built in Australia are manufactured there. The Gold Coast marine industry was responsible for exports worth $110m in 2002, $200m in 2005 and more than $300m in 2010 which was greater than General Motors Holden, Ford Australia and Mitsubishi Australia.[36]

Despite the substantial market share, there has been a decline in the value of the marine industry on the Gold Coast, consistent with manufacturing in general across Australia.[37] This was particularly evident in the 2008–09 financial year, which saw the industry contract on the Gold Coast. In 2008–09, it was reported that 30.8 per cent of marine industry businesses reduced staff or expected to reduce staff, and median annual revenue per business declined by 33.3 per cent from $1.5m in 2007–08 to $1.0m.[38]

Although not reaching pre-GFC levels of economic activity, the economic outputs of boat building on the Gold Coast in 2012 were estimated to be worth $472.1m, with international exports estimated to be $47.5m.[39]

By providing additional manufacturing capability in the GCIMP, there is the potential to increase the economic value from the export of boats made on the Gold Coast. The proponent, as one of the key marine industry investors on the Gold Coast, is well placed to judge the improvement in the marine industry market.

Marine industry

It is still unclear as to when and to what extent the economy will recover, as the marine industry ultimately represents discretionary spending, which are subject to fluctuations particularly during periods of economic uncertainty. However, as outlined above it is considered that the marine industry has shown some positive signs.

[34] http://www.marineqld.com.au/marine-industry-data_copy, viewed 10 November 2013.
[35] http://www.marineqld.com.au/marine-industry-data_cop, viewed 10 November 2013.
[36] http://www.goldcoastbusinessnews.com.au/articles/maximising-the-marine-industry.html accessed 13 November 2013.
[37] Giles Consulting International and Urban Systems, Gold Coast Marine Precinct Strategic Review, Additional information to the EIS, App. 7, p. 12, Giles Consulting, 2013, viewed 29 November 2013, http://www.gcintmarineprecinct.com.au/seis.php
[38] Queensland's Recreational Marine Industry: Annual Report, 2009
[39] Giles Consulting International and Urban Systems, Gold Coast Marine Precinct Strategic Review, Additional information to the EIS, App. 7, p. 12, Giles Consulting, 2013, viewed 29 November 2013, http://www.gcintmarineprecinct.com.au/seis.php

The Sanctuary Cove International Boat Show is the largest on-water boat show in the southern hemisphere and has reported increased attendance and sales over the last three years. Around 37 570 people attended the 2013 show, which has been running for 25 years. The exiting of Riviera from receivership early in 2012 also highlights a more positive outlook for the Gold Coast marine industry with Riviera achieving strong sales.

Furthermore, the third annual Gold Coast International Marine Expo was recently held at the GCMP and attracted 21 326 visitors with many businesses recording the best sales results at a boat show in years.[40] The show provides a location for the public to see shipyard facilities and witness boat building, refitting and repairing first hand. The show provides an opportunity for tourists and the increased number of visitors to the show over the last three years demonstrates increased tourist interest in this type of trade expo.

5.7.2. Project impacts

The EIS reported that the proposed GCIMP would generate approximately 2353 annual FTE years during construction. The flow-on benefits of this employment would generate about 5178 FTE position years in Queensland, with 4354 FTE position years generated within the Gold Coast Region.

The EIS states that the GCIMP project is forecast to provide the following economic and employment benefits to the local region and the state when completed and fully operational:

- The project is estimated to generate approximately $250m of the annual export income for the region. This revenue contribution would contribute to positioning Queensland as the nation's leading recreational boat exporter, therefore adding to the region's appeal for visitors, events and business investments.
- The indirect flow on or multiplier effects of the project on the Gold Coast region and the Queensland economy are projected to be in order of $407m and $4 446m respectively. The scale of this economic stimulus to the Gold Coast is equivalent to between two and three per cent of its annual gross regional product.[41]
- Upon completion the operating revenue of the proposal is projected to be in the order of $754.4m.
- The project is expected to provide approximately 2700 FTE operational employment positions, once completed.

The EIS stated that a minimum of 225 marina berths are needed for the project to be economically viable. The GCWA draft waterways plan states that there is currently a lack of dry storage boat facilities and marina berth infrastructure on the Gold Coast. Therefore, the proponent expects that there is sufficient demand in the market for these berths to be fully utilised.

[40] http://gcmarineexpo.com.au/expo-heralds-a-buoyant-start-to-the-2013-summer-boating-season, viewed 25 November 2013

[41] For a definition of 'gross regional product' refer to the Glossary on page 189 of this report.

5.7.3. Coordinator-General's conclusions

While I consider that some of the economic benefits and employment figures reported in the EIS may be out of date, I acknowledge that if economic conditions improve, there is potential for the benefits to be realised. Although the recreational boating market will continue to experience boom and bust periods as the economy continues along a cyclical path, I consider that development of the proposed GCIMP would assist with diversifying and expanding the Gold Coast's local economy.

I conclude that the GCIMP proposal forms a logical extension to the existing GCMP and would assist with rebuilding the marine industry on the Gold Coast. The marine industry makes a significant contribution to the Gold Coast economy through the training of skilled employees and export of products both domestically and internationally. I consider that development of the GCIMP would provide many economic benefits to the Gold Coast.

5.8. Land use

5.8.1. Existing planning controls over site

Development on the site is currently controlled by the Gold Coast City Council planning scheme, *Gold Coast Planning Scheme 2003* (GCPS) and in particular the Coomera Local Area Plan (LAP). Land use provisions under the LAP applying to the site are:

Majority of the site:

- Precinct 3: Marine industry.

Northern portion of Site adjoining Oakey Creek:

- Precinct 9: Rural living/open space
- Precinct 10: Conservation and landscape protection.

Western portion of the site:

- Coomera Town Centre Structure Plan—Precinct 9e: Conservation.

The intent of the LAP is to plan and set out the requirements of a future community greater than 60 000 people. The LAP identifies the desired environmental outcome for the designated marine precinct is for it 'to be developed and promoted as a world class waterfront industry area.'

The Coomera LAP states that planning for local employment opportunities will create less travel demand outside the Coomera area, and will further support development that is closely allied with the principles of accessibility and transit oriented development.

The LAP identifies constraints that would require consideration prior to development. Parts of the area are at or near sea level, and drainage and potential acid sulfate soils are identified as issues. The LAP also identifies segments of remnant vegetation which should be retained, particularly along creek and drainage lines (as can be seen in Figure 5.7).

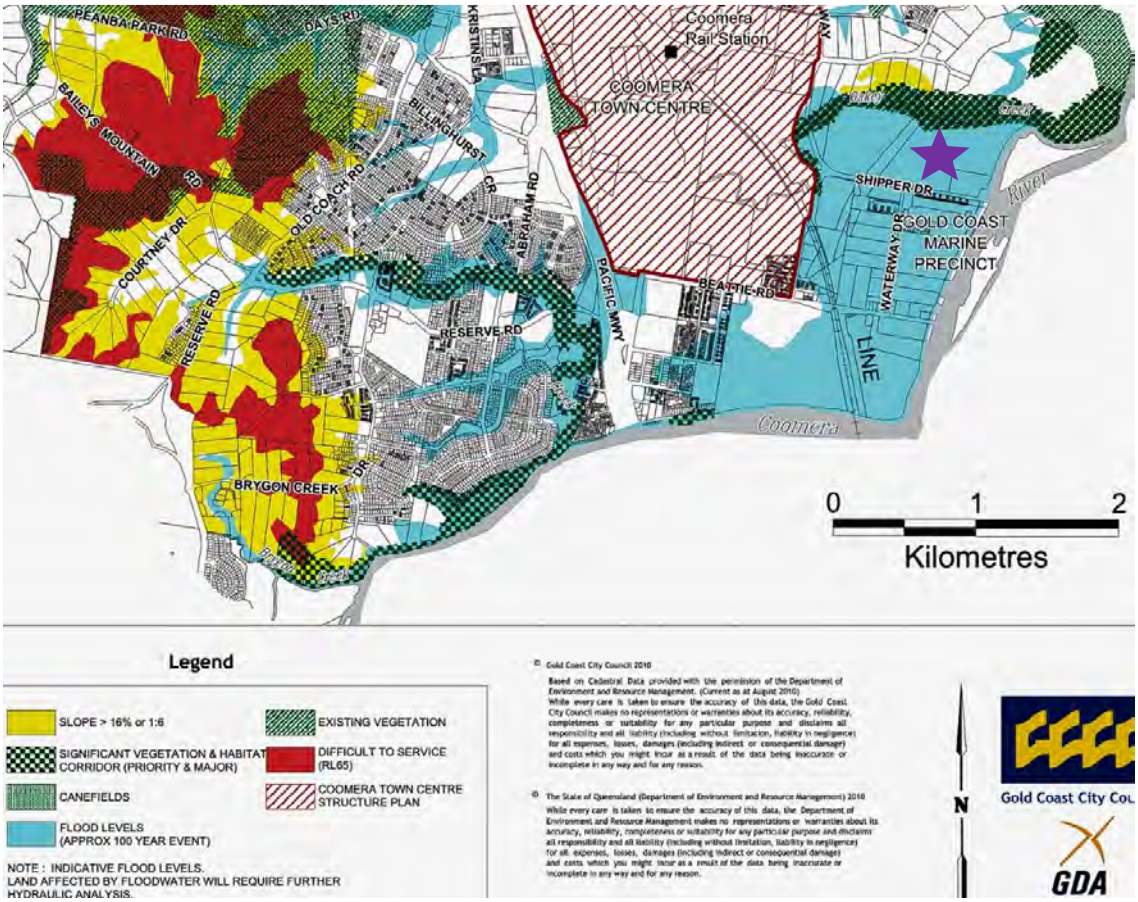

Figure 5.7 Coomera LAP constraints map extract

Precincts

The preferred pattern for future development has determined the boundaries of the precincts, with common activities placed in the same precinct.

Precinct 3: Marine industry—preferred character and intended land use

In the LAP, the marine industry is identified as an economic sector which has future prospects for local economic growth for the Gold Coast. The defined marine industry precinct at Coomera includes approximately 250 ha of land. The LAP contemplates a range of marine industry businesses and industry associated with manufacturing sports fishing boats, aluminium fishing dinghies, motor cruisers, fibreglass and reinforced plastic boats, outboard motor boats, and commercial and recreational boats.

While the LAP states that ancillary business and industry is also encouraged, businesses are strictly regulated and restricted to industries such as marine lighting, boat fittings, steering controls, propeller inspection systems and marine instrumentation manufacture.

As it is essential that businesses in this precinct have direct access to the Coomera River, the LAP contains no plans for a continuous open space corridor between the marine precinct and the river.

Development applications in the marine industry precinct area would be assessed against the following planning objectives:

- provision is made for large (50 m) boat maintenance and refit facilities which require water access
- to preserve the manufacturing integrity of the precinct, residential uses are not permitted.

5.8.2. Description of existing land uses

The proponent owns the bulk of the proposed GCIMP site, and a large portion is currently used for grazing livestock (Figure 5.8). The other main use of the site is William Guise Foxwell Park (the park), which is state-owned land, dedicated as a park and recreation reserve with GCCC as trustee. The park is currently used by the Hinterland Model Flying Club. Recreational fishers use the foreshore of the park to access the river. The proponent is seeking to acquire this park as part of the development.

Figure 5.8 Animals grazing on site

Surrounding land uses

Land uses in proximity to the site include nature conservation areas along the banks of Oakey Creek, residential developments and the existing marine precinct. Residential, commercial and open space land uses are planned for, or have already been developed, to the north and west of Oakey Creek.

Gold Coast Marine Precinct

The existing GCMP is located on the Coomera River adjacent to the proposed development. The GCMP is a major marine industrial centre dedicated to manufacture, servicing, repairs and refits of recreational boats. At present, approximately 60 ha or 30 per cent of this precinct has been developed with an estimated $120m invested by the private sector.

Land uses located at the adjoining marine precinct include the purpose-designed marina, factories, showrooms and offices which have been designed to service the

needs of all types of boat owners, ranging from jet skis to super yachts. The GCMP is the largest shipyard of its kind in the southern hemisphere.

Residential canal developments

Canal development and modifications to the Coomera River have occurred over a 40-year period. Residential canal developments that incorporate marinas have intensified since the construction of Sanctuary Cove in the 1990s (as can be seen in Figure 5.9).

Figure 5.9 Canal and marina development along Coomera River

Much of this area has been reclaimed or filled so that the land is typically low lying (below 5 m AHD) and flood-prone. The introduction of these estates has caused significant modifications to the waterways structure.

The EIS reported that in February 1998, the Queensland Government introduced its Policy on Coomera River Developments. One part of the policy relates to canal and marina development on the river and states that 'the interim limit of the waterway area available for canal development in the Coomera River' is 231 hectares. To date,

approximately 200 ha has been utilised and the EIS noted that the GCIMP would utilise 11.5 ha of the residual allocation.

Table 5.4 lists the existing marinas on the river and the corresponding number of wet berths.

Table 5.4 Marinas and berth numbers on the Coomera River

Coomera River marina	Wet berths
Gold Coast City Marina and Shipyard	173
Hope Harbour Marina	275
Hope Island Resort Marina	236
Coomera Waters Marina	70
Sanctuary Cove Marina	297
River Links Marina	297
Total	**1348**

Dredged material disposal options

The popularity of the waterfront lifestyle and the success of the GCMP has resulted in heavy use of the Coomera River by vessels of all sizes for recreational and commercial purposes. This has increased demand for depth within the waterways to be maintained through dredging for safety reasons and to maintain the viability of industries which the waterways support.

A review of a small sample of development approvals along the river (such as Hope Island and Waterway Downs) indicates there has been no requirement for any of the developments to address the disposal of dredge material at a regional level.

The waterways have been dredged on numerous occasions in the past for navigation purposes, with dredged material disposal achieved via land fill, reclamation, commercial production of sand/gravel and offshore dumping.[42]

Over the years, the Queensland Government has invested $12m on dredging projects to maintain the Gold Coast waterways channel network, including the Coomera River. Recently completed dredging projects include the:

- south channel of the Gold Coast Broadwater
- north channel of the Gold Coast Broadwater (completed in February 2011)
- Gold Coast Seaway entrance (completed in April 2011).

Dredging of the river undertaken for the GCMP extracted approximately 140 000 m^3 of sand and clay along a 12 km stretch of the Coomera River (see Figure 5.10).

[42] Coomera River and Broadwater navigation channels: dredging and dredged material disposal strategy—phase three final report (December 2007, ref: BEN405-G-REP-005 Rev 1) page v.

Figure 5.10 Dredging the entrance to the GCMP

The material dredged from the Broadwater channel to Sanctuary Cove can be categorised as sand; while the material from Sanctuary Cove to the motorway bridge is categorised as mud to sediment. Historically, dredge material associated with channel maintenance has been disposed of via near-shore nourishment (sand) and as a blend for local development fill at Hope Island and Coomera (mud and sediments). Correspondence from GCWA dated 23 September 2013, advised that the section of the river adjacent to the existing marine precinct has not been dredged since the precinct was first constructed over ten years ago. This is because there is no suitable disposal option for the dredge material, as this material includes fines and mud materials.

While it is intended that near-shore nourishment continue to be the preferred dredge material disposal method for the Broadwater channel to Sanctuary Cove, opportunities to dispose of dredged material from the Sanctuary Cove to motorway channel with local developers is declining and there is an identified lack of suitable onshore sites for dredge material rehandling and disposal.

Coomera River and Broadwater navigation channels—dredging and dredged material disposal strategy

Kellogg Brown and Root Pty Ltd (KBR) were commissioned by the former Queensland Transport[43] and GCCC to prepare a long-term dredge management strategy for the Coomera River and the Broadwater. The study was to investigate potential land-based sites that could be used for material rehandling and/or ultimate disposal and assess these in conjunction with other feasible alternative disposal scenarios.[44]

[43] This department is now known as the Department of Transport and Main Roads.
[44] KBR, *Coomera River and Broadwater navigation channels: dredging and dredged material disposal strategy – phase one final report* (November 2004, ref: BEN405-G-REP-003 Rev 1) prepared for Queensland Transport pp. 1-2.

GCCC also requested KBR identify disposal options for material dredged from areas outside of the Coomera River, such as the Nerang River.

The phase one report of the study was finalised by KBR in November 2004 and concluded that rehandling sites within the Coomera River floodplain would be more economically viable than similar facilities outside the floodplain due to the difficulty and high cost associated with transporting dredge material over large distances directly from the dredge site.[45]

The reports for phases two and three were completed in July 2006 and December 2007 respectively. The phase three report provided a concept design for a dredge material rehandling facility and identified two potential sites for such a facility within the designated marine precinct. The preferred site was at the very southern end of the designated marine precinct, bound by Beattie Road and the Coomera River. The second site identified by the study was 9 ha on the western portion of the proposed GCIMP site.

With regards to GCCC disposal of material that does not form part of the Coomera River, KBR advises that the issue would be best resolved if 'GCCC could find an end receiver who could accept the dredge slurry such as a disused quarry.'[46]

The phase three report identifies the following actions for phase four of the project:

- endorsement of final report
- detailed design
- approvals
- land acquisition
- construction.

Responsibility for dredging

On 1 December 2012, the *Gold Coast Waterways Authority Act 2012* commenced, establishing the GCWA. The main purpose of the Act is to deliver the best possible management of the Gold Coast waterways at reasonable cost to the community and government, while keeping government regulation to a minimum. General powers of the GCWA include the authority to acquire, hold, dispose of and deal with property to help achieve the purposes of the Act.

Specific functions include:

- plan for and facilitate the development and management of the Gold Coast waterways over the long-term in a way that is sustainable and considers the impact of development on the environment
- improve and maintain navigational access to the Gold Coast waterways
- develop and improve public marine facilities relating to the Gold Coast waterways
- promote and manage the sustainable use of the Gold Coast waterways for marine industries, tourism and recreation.

[45] KBR pp. 1-1–1-2.
[46] *Coomera River and Broadwater navigation channels: dredging and dredged material disposal strategy – phase three final report* (10 December 2007, ref: BEN405-G-REP-005 Rev 1) p. 4-8.

Additional funding totalling $35.3m over four years has been provided to the GCWA from the $120m state-wide marine infrastructure fund including $30m to improve the management of and access to Gold Coast waterways. This funding is to be expended during the four years 2012–13 to 2015–16.[47]

The GCWA has committed to a number of dredging projects as part of the management program in accordance with known or anticipated needs. However, the program notes that the need for dredging is an environmental variable and the dredging program will be adjusted as necessary to reflect changing conditions and priorities.

GCCC is responsible for dredging of a small number of canals on the lower Coomera River while the body corporate for individual canal and marina development is often responsible for the maintenance dredging of the waterway community.

5.8.3. Proposed planning controls

GCIMP development code

The purpose of the proposed development code presented in the EIS and in the additional information to the EIS is to provide the locational and assessment criteria to facilitate the establishment of a range of marine industry and complementary land uses in the defined GCIMP area.

The proposed code has been designed to adopt the most appropriate level of assessment for industrial and commercial uses in an existing marine industry zone, in order to facilitate the efficient development of the land and ensure that development assessment requirements are proportionate to the level of risk.

Elements within the development code relevant to my assessment are detailed below.

Objectives

Objectives of the development code include:

(1) protection of adjacent environmental areas

(2) provision of appropriately scaled tourist and retail activity within the precinct that is designed not to compromise the viability of existing or future marine industry development

(3) maintain or enhance opportunities for public access and use of the foreshore.

Tables of development

The tables of development provided in the development code define the necessary level of assessment (i.e. exempt, self-assessable, code assessable or impact assessable development) for subsequent material changes of use, operational works and reconfiguration of lot applications over the site.

[47] GCWA management program, http://www.gcwa.qld.gov.au/userfiles/resources/static/GCWA_Waterways_Management_Program.pdf

Relevant codes

Codes relevant to guide the assessment of future development applications have been provided. These codes were derived from the GCCC planning scheme. The GCIMP development code applies in all cases.

It is noted that a specific development code will only apply when that specific type of development is proposed. A constraint code will only apply where the proposed development is directly impacted by the constraint that is the subject of that code.

GCIMP place code

The place code outlines the performance criteria and acceptable solutions for all development within the GCIMP.

A range of land uses and services are proposed to broaden the diversity of activities and capacity of the GCIMP, GCMP and wider community.

Environmental protection development requirements

The following outcomes have been incorporated into the GCIMP development code to ensure the protection of environmental values in and around the site.

- Development is located, designed and constructed and managed to avoid or minimise:
  - impacts arising from:
    - altered stormwater quality or flow and
    - waste water
  - the release and mobilisation of nutrients that increase the risk of algal blooms in coastal waters
  - the disturbance of acid sulfate soils and the release of acid and associated metal contaminants into receiving waters.
- Areas used for storing environmentally hazardous materials in bulk are located to take into consideration the likelihood of flooding.
- To achieve the ongoing minimisation of environmental harm resulting from the development, all facilities/buildings/structures at which activities will be carried out, must be designed to permit the activity to be carried out in accordance with best practice environmental management (as defined in the *Environmental Protection Act 1994*).[48]

Amenity protection development requirements

Outcomes incorporated into the GCIMP development code to ensure the protection of local amenity in and around the site include:

- Potentially obtrusive noise, odour and visual impacts are effectively buffered. Examples of mitigation treatments include: landscape buffers, earth mounds, acoustic treatments and/or acoustic fencing.
- The proposed use must not adversely detract from the existing amenity of the local area; and it must also take into account and seek to ameliorate any negative

[48] For a definition of 'best practice environmental management', refer to the Glossary on page 189 of this report

aspects of the existing amenity of the local area, having regard but not limited to the impact of:

- noise
- hours of operation
- traffic
- lighting
- signage
- visual amenity
- privacy
- odour and emissions.

Marine industry development requirements

The following outcomes have been incorporated into the GCIMP development code to ensure the protection of the marine industry activities (existing and proposed) in and around the site:

- allotments are of regular shapes suited to the intended uses and allowing design flexibility, efficient development and access
- road design ensures the safe movement of heavy articulated vehicles
- the design and provision of water, stormwater drainage, sewerage, electricity, gas and communications networks meets the needs of industry and business, and provides an orderly and economic progression of services development in the region.

5.8.4. Proposed land uses

In combination, the existing GCMP and the proposed GCIMP would encompass a total area of approximately 125 ha, roughly half of the 250 ha designated marine precinct.

Precincts

The GCIMP proposes four precincts in which common activities would be placed (see Figure 5.11).

Figure 5.11 GCIMP proposed precinct plan map

Precinct one—western precinct

The western precinct is proposed to accommodate a broad range of waterfront industry, industrial and complementary uses that broaden and support the economic development and functionality of the marine precinct. Preferred activities would typically focus on the production, manufacture, construction, distribution or servicing of the marine industry and associated goods and generating high levels of long-term employment. Food and convenience facilities would also be provided to improve the amenity for precinct employees.

A 2.2 ha dredge material rehandling facility is to be provided to allow for the ongoing maintenance and functionality of the marina. As shown in Figure 5.12, the EIS also presented a master plan option, which incorporates 9 ha of land which could cater for a regional dredge material rehandling facility.

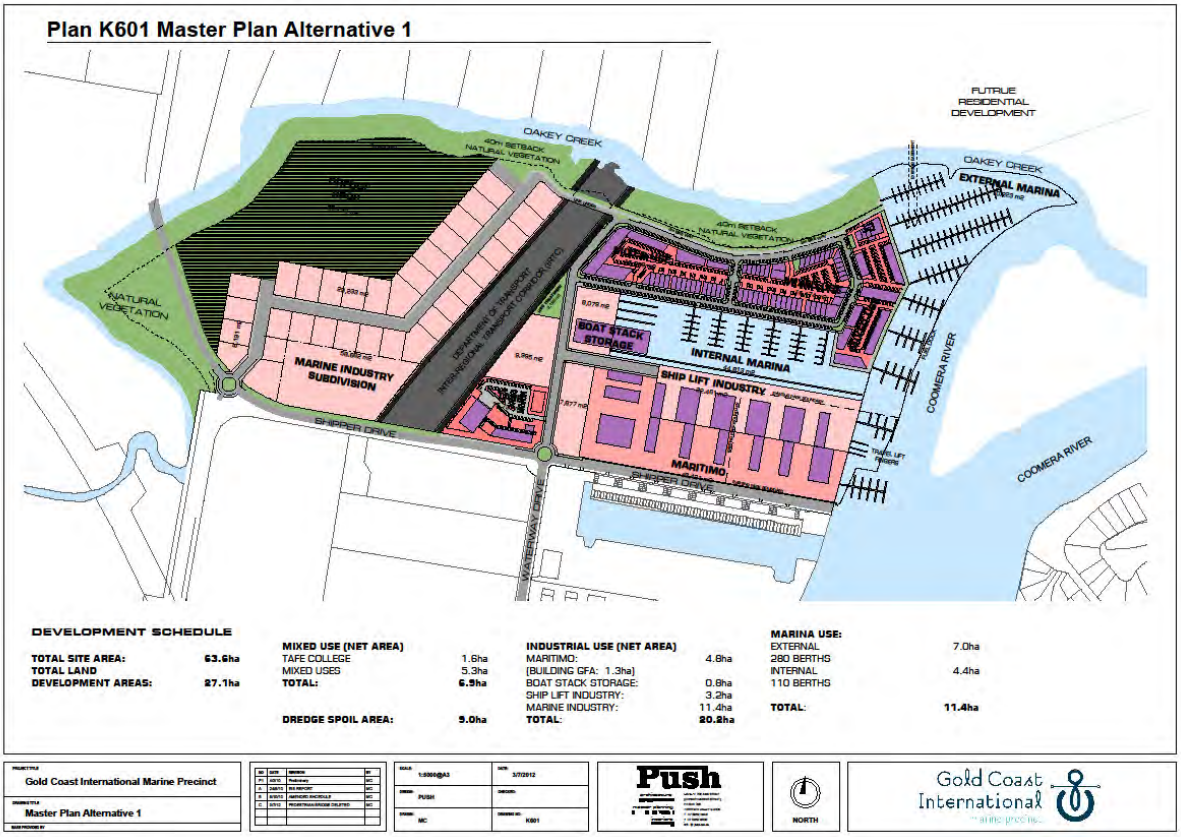

Figure 5.12 Master plan option providing land for regional dredge material disposal area

Precinct two—northern precinct

A variety of commercial, industrial, leisure, and short-term accommodation land uses that support the marine industry are proposed for this precinct.

Land located directly south of Oakey Creek is proposed to be developed in majority for commercial and showroom uses to support the economic development of the surrounding marine industrial precinct. Land fronting the external marina is proposed to be developed as a vibrant, lively centre for the GCIMP. Entertainment uses such as restaurants, shops, cafes, taverns, short-term accommodation and eateries are encouraged in order to promote the area as a vibrant centre that facilitates interaction between workers, locals, visitors and boat users. It is envisaged that recreational boat users in need of ship repairs would stay overnight at the GCIMP while the repairs are undertaken.

The northern precinct is also proposed to facilitate boat activities and access to the water.

Precinct three—southern precinct

The southern precinct is proposed to be developed for marine-focused and related industries, with direct access provided to the Coomera River and additional access via

the internal marina. Boat building, repairs and storage, warehouses, waterfront industry, manufacturing, associated industry, marinas, boat stacks, transport terminals, wharves and docks are anticipated to be developed within this precinct.

Pedestrian-friendly access would be encouraged along the marina; however, any potential pedestrian conflict with industrial activity would be appropriately managed.

Precinct four—conservation/open space

The proposed conservation/open space precinct is intended to conserve the natural vegetation and environmental values of Oakey Creek along the northern and western boundary of the GCIMP. Protection of conservation values would occur through the conservation of wildlife and areas of ecological significance.

This precinct also contributes to an important buffer separating the industrial functions of the Coomera marine precinct from existing residential areas to the north of Oakey Creek. No urban development is anticipated within this buffer area.

Proposed reconfiguration of lot

The development of four precincts proposed for the GCIMP would be facilitated through the implementation of the plans of subdivision contained in Appendix 2 of the EIS (Figure 5.13 shows the stage one plans).

The reconfiguration of a lot (ROL) plans seek to create:

- 63 freehold marine industry lots within the western precinct of the GCIMP
- 6 community title lots within the northern precinct of the GCIMP development (inclusive of one seabed lease for the internal and external marina)
- 3 community title lots within the southern precinct of the development (inclusive of one seabed lease for the external marina)
- conservation open space areas
- public road.

The ROL would take place over four stages.

Lot sizes and tenure arrangements

Should the subdivision plan be implemented, the marine industry allotments would range from 1559 m^2 to 3618 m^2 and the average freehold marine industry lot size would be 2000 m^2. The plan proposes that all lots to the west of the IRTC created under the ROL planning application would be freehold standard format lots.

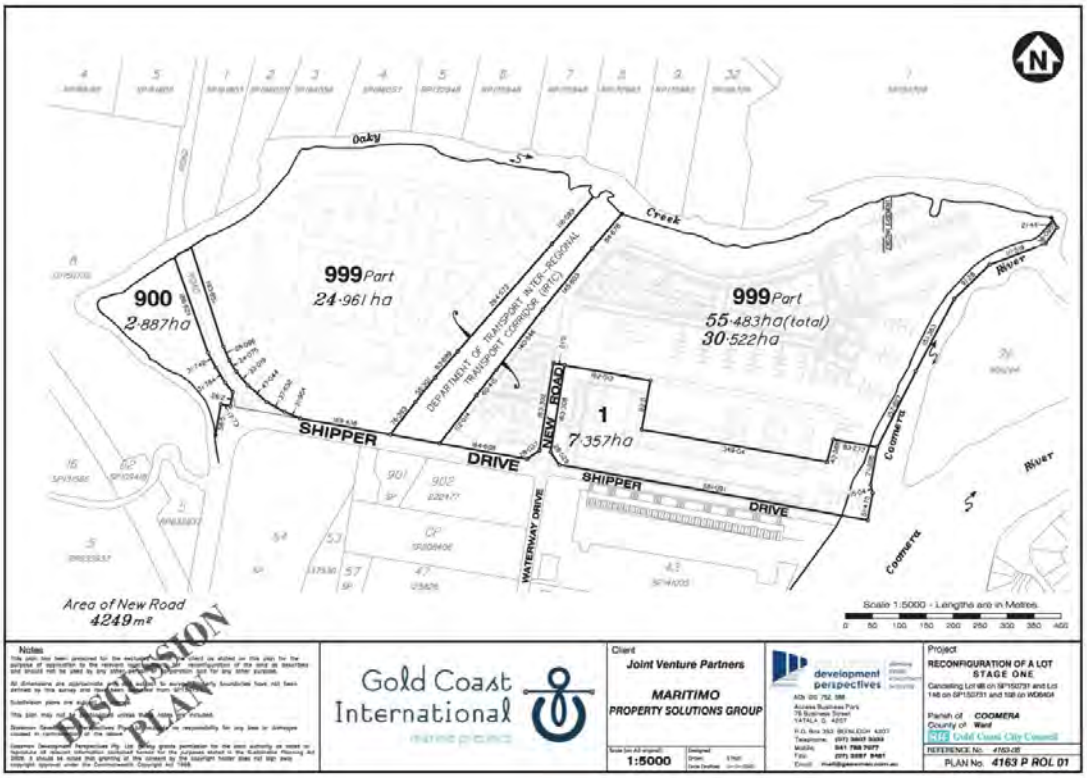

Figure 5.13 Reconfiguration of a Lot Plan (Stage One)

5.8.5. Interaction with adjacent land use

Planning for the marine industry precinct was undertaken in the mid to late 1990s with development commencing in the late 1990s, and commercial operations commencing in the early 2000s. There has been no review of the land uses regulated by the planning controls over the precinct since the initial planning was conducted nearly 20 years ago.

The current planning provisions confine land uses and activity within the marine precinct to a narrow economic purpose. This is demonstrated by the fact that only 30 per cent of the 250 ha precinct is developed. The precinct is well serviced by sunk infrastructure[49] such as roads, utilities and marine infrastructure, which is currently underutilised.

The proponent advises that there is uncertainty in the marine industry about the scope of uses that are permitted in the existing marine precinct, particularly where the activities partly, but do not fully support the marine sector. The proponent considers that this uncertainty is adversely affecting investment and employment in the precinct.

By way of example, in current demand conditions a trade or service may need to rely on markets beyond the marine sector; for example, the marine sector could account for 30–40 per cent of the business of a wood craftsman but not 100 per cent. As these

[49] Definition of sunk infrastructure can be found at page 189 in the Glossary of this report.

uses are not substantially or completely committed to marine industries, they are not permitted under the current planning provisions.

Narrow and restrictive land uses lessen and do not enhance the supply chain or skills base of the Gold Coast marine industry and hence reduce the viability of the businesses in the area. While the proposed GCIMP development code and associated documents would provide for a logical extension of the existing marine precinct, the expansion of uses proposed within the precinct is not supported by GCCC; although the marine precinct is proposed to be the primary land use in the precinct in accordance with GCCC planning requirements.

The introduction of some of the proposed land uses, such as short-term accommodation is currently not contemplated in the GCCC planning scheme. However, to ensure conflicts between land uses are minimised, the proponent has written into the development scheme that any short-term accommodation will be constructed with appropriate noise attenuation and environmental treatments. Furthermore, the development scheme requires all industrial activities on the site to be constructed using best practice environmental management to further address any incompatibility of land uses in the precinct.

As the GCIMP development code proposes to create a small and high activity area of an urban nature by expanding the land uses to incorporate a tavern, the GCIMP has the potential to create a new entertainment destination on the Gold Coast waterways for visitors and residential boat users alike.

5.8.6. Coordinator-General's conclusions

I note that the EIS reported the economic benefits from the GCIMP would be reduced with the incorporation of a regional dredge material rehandling facility on the western portion of the development. However, I consider that the proponent for the overall Coomera marine industry precinct would benefit from such a facility, as it would facilitate more frequent dredging of the Coomera River and improve access to the precinct for larger vessels. Furthermore, it was reported in the EIS that the proponent is prepared to sell land to enable the delivery of such a facility.

Both the proponent and GCCC aim to create a world class waterfront industry area with the development of the GCIMP. I consider that the likelihood of achieving this objective depends on the businesses that have or will invest in the area to create jobs and generate manufacturing potential.

I conclude that the overall balance of land uses proposed by the GCIMP development code would preserve the core marine industry use while providing sufficient flexibility to enhance the strength of businesses. Expansion of permitted land uses would also allow the market to play a greater role in determining the nature of activity within the precinct.

Furthermore, the expansion of land uses proposed within the precinct would improve economic sustainability of the development and attract visitors to a new destination on the Gold Coast waterways. I consider that this would also benefit the broader marine industry precinct as a whole, by potentially increasing patronage and visitor numbers.

I conclude that the proposed development code for the GCIMP has responded to business owner needs and represents an approach that continues to achieve the objectives outlined in the LAP by allowing the marine industry to cater for periods of low demand by broadening the economic base of businesses in the precinct while retaining an appropriate mix of uses.

In reviewing the preferred mix of land uses within each specific precinct, as identified in the Tables of Development contained in the GCIMP development code, I observe that the land use definitions of the current GCPS have not been altered. While I support the use of the current definitions in the GCPS, I note that the GCCC is in the process of updating its planning scheme, which will use the definitions of the Queensland Planning Provisions version 3 (QPP).[50] I recommend that the proponent work with GCCC with regards to the timing of the section 242 application and if necessary, update the GCIMP development code to reflect the QPP.

I consider that the proposed development requirement tables provide appropriate assessment levels for industrial and commercial uses in an existing marine industry zone. They ensure that development requirements are proportionate to risk and provide an appropriate level of mitigation strategies to minimise potential land use conflicts.

By incorporating the requirement for best practice environmental management to minimise any negative impacts on neighbouring developments, both industrial and residential into the GCIMP development code, I consider that the proponent is responsibly addressing concerns raised by GCCC and residents during consultation on the project.

Loss of public parkland

I conclude that the need for the William Guise Foxwell Park to become part of the precinct is necessary to the success of the proposal. The requirement for adequate access to the Coomera River is of primary importance and restricted to very few places on the Gold Coast. Without the parkland river frontage, the development is severely compromised both in scale and waterfront access. The park represents approximately 3.7 ha of developable marine industry land and 170 m of riverfront access. The significant feature of the internal marina facility would be lost to the project without the parkland. This would severely compromise the efficiency and viability of the precinct, especially in terms of attracting new ship lifting businesses into the precinct.

As stated in the South East Queensland Regional Plan 2009–2031 (SEQRP), South East Queensland's long-term economic future depends on improving the competitiveness of local trade-exposed businesses. In particular, the SEQRP notes that marine industries must be able to expand in locations providing deep water frontage, such as the GCIMP.

I have included a recommendation to require the DNRM to commence negotiations on the sale. I have also recommended that GCCC relinquish trusteeship of the park.

[50] Department of State Development, Infrastructure and Planning, Queensland Planning Provisions, Department of State Development, Infrastructure and Planning, Brisbane, 2013, viewed 9 December 2013, http://www.dsdip.qld.gov.au/resources/policy/state-planning/qpp-3.pdf.

5.9. Infrastructure

5.9.1. Existing

As the proposed development is situated adjacent to the existing GCMP, it would have the capacity to connect to some existing infrastructure. Surveys were undertaken during the preparation of the EIS to establish the location of existing underground services within adjacent road reserves and open space areas. Data searches were also conducted in consultation with the various service providers to establish the relative spatial position and capacity of the existing services. (Detailed surveys of the existing underground services would be undertaken as part of the detailed design process associated with the GCIMP project.)

Energy is currently supplied to the project site is via an underground 11kV/415V network, running along the western and southern sides of Shipper Drive. This service is fed from the existing Coomera zone station via two separate high voltage feeders, and supplied via pole-mounted and pad-mounted transformers.

An existing optical fibre cable is located within Shipper Drive adjacent to the development site. This fibre cable is a suitable connection point for the site.

A gas service is not currently available to the proposed project site. APA Group is the local gas service provider and it owns and operates an existing 160 mm PE high pressure natural gas pipeline located within Foxwell Road.

The proposed development site is included in the Pimpama–Coomera water catchment area, for which GCCC requires the adoption of an integrated water management approach to the provision of wastewater infrastructure. The requirements for sewerage reticulation incorporate reduced infiltration gravity sewer systems. An existing sewerage system is located adjacent to the development site area and is comprised of a vacuum pump station and rising main located within Waterway Drive. This system currently services the existing GCMP and ultimately pumps sewage west to Beattie Road and north to the Pimpama Coomera wastewater treatment plant.

The EIS stated that no sewerage connection is currently proposed for the project site. During the preparation of the EIS, Gold Coast Water advised that the existing vacuum pump station located within Waterway Drive is at its peak capacity and discharge into the existing vacuum pump station and/or rising main would result in failure of the system.

Potable water is supplied to the existing marine industry precinct via a 225 mm GCCC-owned water main, located at the intersection of Shipper Drive and Waterway Drive. There is also an existing 450 mm diameter water main at Foxwell Road.

5.9.2. Construction infrastructure requirements

Construction water supply

During the construction phase of the project, water supply will be sourced from three main locations as follows.

On-site water harvesting

On-site water treatment basins will be constructed as a dual-use water quality device to capture sediments and nutrients and will also be utilised as a water source for the compaction of material to the optimum moisture content during earthworks. The primary source of this water will be rainfall.

Off-site recycled water supply

Recycled water within the Coomera region will be used as an alternative source of water during low rainfall events and will be supplied from a recycled water draw off point.

Potable water supply

There is a variety of options for the supply of fresh drinking water to employees on the site. One option is to connect to the existing potable water system located within Waterway Drive. A permit to access this water would be sought from GCCC. Alternatively, water could be supplied to the construction workforce via trucks. Water shall be supplied to the site on an 'as needed' basis.

The EIS noted that only recycled water would be used for construction purposes and an emphasis on the reduction in supply demand from the potable system would be incorporated into the construction management plan.

5.9.3. Proposed infrastructure

In its fully developed form, the proposed GCIMP is estimated to require a load of 6.78 MVA which is made up from 1.65 MVA (55 lots Standard URD Subdivision) plus 5.13 MVA (mixed commercial/industrial development). This usage has been derived from GCCC's Priority Infrastructure Plan. Following an assessment of this demand on the existing network infrastructure, the proponent reports that upgrades would be required to cater for the proposed development.

Energex has advised that upgrades are proposed for the area, including two-zone substations and construction of a new 111 kV feeder to the site; and that there are spare conduits available for the development. The proponent reported in the EIS that construction timing, staging and required load will be given to Energex to enable the new zone substation to be planned.

An internal optical fibre or copper cable telecommunications network is proposed be installed within the development, with direct connection to the service within Shipper Drive. The EIS reported that this will be adequate to service the GCIMP.

An estimate of the natural gas usage for the fully developed GCIMP was calculated based on the proponent's preferred master plan. Anticipating the gas usage of each individual tenancy for either hot water, cooking, heating and manufacturing requirements, the proponent estimates the total usage to be 19 200 M/j.

This estimate has been forwarded to the local natural gas supplier, APA Group, which would allow the company to estimate reticulated supply pipe sizing of infrastructure to the site. This consultation would also identify costs and assess whether APA Group can offer the connection for free, or whether a financial contribution would be required.

The internal sewer reticulation system for the subject development would incorporate a low pressure sewer system, with reduced infiltration gravity sewer principles for the gravity component of the sewer system. To determine the impacts of the proposed development on the existing sewerage infrastructure, the EIS presented a sewerage network assessment analysis over the proposed development site. Information relating to land uses was obtained from the project's master plan, GCCC's policy for Infrastructure (Sewerage Network Developer Contributions) and the temporary local planning instrument *Water Supply and Sewerage Land Use - Category Demand Table for Policies 3A and 3B* to estimate sewerage demand. The flow calculations were derived from the GCCC *Land Development Guidelines*, section 5.2.

All the proposed lots in the development are to be sewered and the sewer mains have been placed external to the individual lots where possible, to maximise the usable area on the allotments and to enable effective access for future maintenance. Sewage pump-out systems are proposed to service the marine vessels while they are docked at the marina.

Engineering drawings K237-AA001578-01 to K239-AA001578-01 provided in the EIS provide a detailed description of the proposed land use locations and the areas in which the calculations of the project sewerage discharge requirements are determined.

As required by GCCC, the proposed development would be in accordance with the GCCC's water sensitive urban design criteria. Therefore, the proponent proposes to incorporate rainwater harvesting tanks to capture and re-use rainwater. The harvested water may be re-used for landscaping irrigation, toilet flushing, hardscape wash down and boat washing purposes. This would reduce the loading demand of the proposed development on the GCCC's potable and recycled water supplies.

The GCIMP proposes to utilise a combination of recycled water and potable water sources to service the marina berths. Recycled water would be utilised for the purpose of boat washing, washing of hardstand areas and for top-up of non-potable water sources such as toilets. In addition, recycled water supply would be utilised to berthing for firefighting services.

Recycled water would be supplied to the development via a recycled water main within the development. The service is proposed to be provided via a 200-millimeter-diameter water main and constructed along the alignment of the IRTC. The future main would provide a connection between Shipper Drive and Foxwell Road. A separate connection from the potable water would be maintained to ensure cross-contamination from the recycled water line does not occur.

Potable water lines are also proposed to service the marina berths for use in potable water applications such as drinking water, domestic washing and showers. The proponent has committed to developing the GCIMP to meet the GCCC Water's desired standards of service for potable water supply.

As part of the proposed development works, the proponent would construct an internal dual water reticulation service in accordance with the *Gold Coast City Council Land Development Guidelines* and *Policy 3A: Policy for Infrastructure (Water Supply Network Developer Contributions)* requirements. The service would include providing a

metered box to each industrial and commercial allotment with separate metering systems provided for each individual title.

5.9.4. Issues

The EIS noted that infrastructure for various utilities would require placement across the IRTC corridor. Technical information pertaining to the placement of utility services across the IRTC corridor would be resolved through subsequent applications, following detailed design of the GCIMP. The proponent has committed to identify the appropriate permit/lease arrangement applicable for the required infrastructure within the IRTC corridor. TMR's advice is that its preference is for the proponent to enter into an infrastructure agreement and leasing arrangements to ensure that the integrity of the IRTC will not be compromised.

5.9.5. Coordinator-General's conclusions

I consider that the EIS reports on infrastructure required to service the proposed GCIMP demonstrate the development can be adequately supplied with services satisfactory for the construction and operational phases of GCIMP.

I note that the proponent has sensibly proposed to construct all services infrastructure within the existing and future dedicated road reserve areas, recognising that GCCC would eventually be the owners of all services infrastructure contained within these reserves.

I require the proponent to continue to work with GCCC during detailed design of the GCIMP to ensure that all infrastructure services are constructed and operated in accordance with GCCC's service standards, at no cost to Council.

5.10. Traffic and transport

5.10.1. Overview

Existing road network

Local roads

The marine precinct connects to the Pacific Motorway via Foxwell Road and Beattie Road, which are GCCC controlled roads. Figure 5.14 shows the road network around the marine precinct.

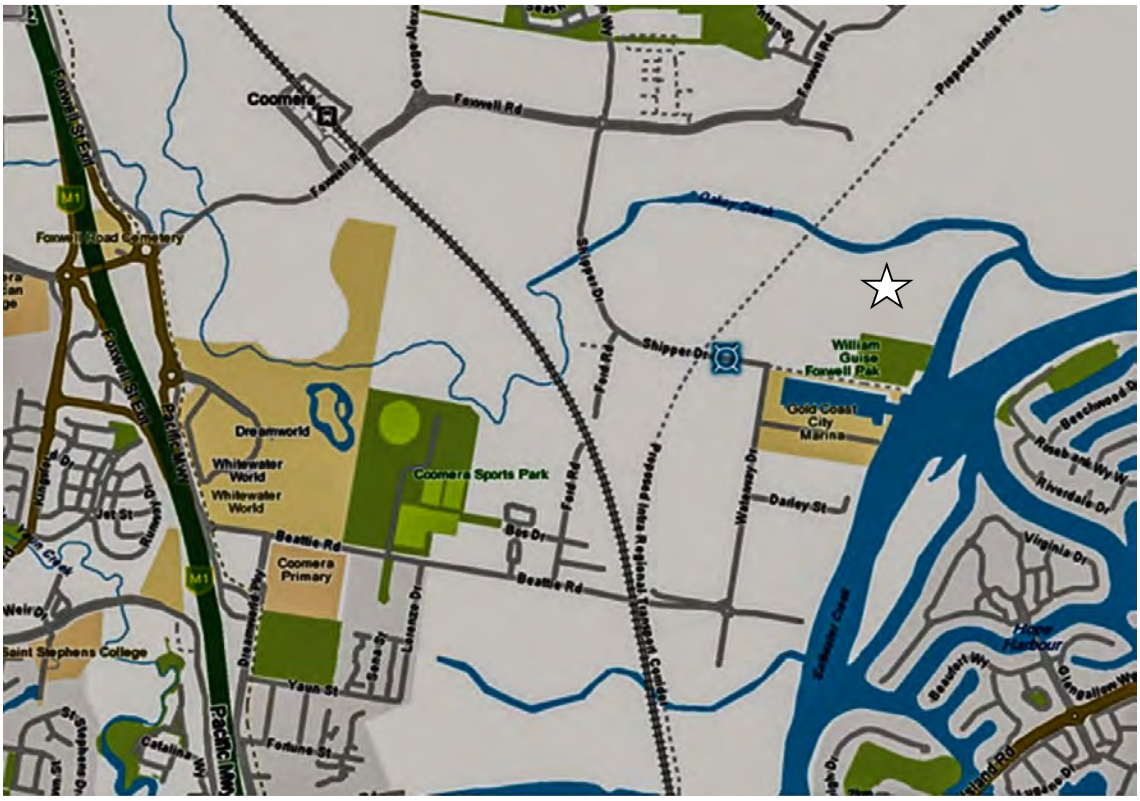

Figure 5.14 Road network

Foxwell Road has recently been duplicated by GCCC between Oakey Creek Road and the Coomera railway station, providing two traffic lanes in each direction in this section. Elsewhere, Foxwell Road provides a single traffic lane in each direction. Beattie Road is a two-lane road with a posted speed limit of 60km/hr.

Waterway Drive and Shipper Drive provide access to frontage properties within the marine precinct and are classified as industrial/commercial roads. Both roads have been constructed to GCCC standards for an industrial collector street, with a total pavement width of 14 m. Waterway Drive has a posted speed limit of 50 km/hr while Shipper Drive has a posted speed limit of 60 km/hr west of Waterway Drive.

The intersection of Waterway Drive/Beattie Road is controlled by a single-lane roundabout, while the intersection of Shipper Drive and Foxwell Road is controlled by a double lane roundabout.

The western side of the Pacific Motorway/Foxwell Road interchange has reached capacity with significant queuing and delays occurring at the intersection of Days Road/Abraham Road and on the overpass during morning and afternoon peak hour periods. In particular, the northbound off-ramp and Days Road approaches are heavily congested. The roundabout has insufficient geometry to accommodate five legs, and the heavy peak hour demands are generated by the numerous schools located on the western side of the motorway.

The roundabout on the eastern side of the motorway overpass generally performs satisfactorily during normal peak traffic periods.

State-controlled roads

The project site is approximately 2.7 km from the Pacific Motorway. The state-controlled road mostly impacted by the project is the Pacific Motorway, particularly the Foxwell Road/Days Road interchange as well as the Beattie Road and Service Road intersections.

The existing Pacific Motorway interchange at Days Road and Foxwell Road will reach capacity by 2021 and require upgrading regardless of the proposed development.

Planned road network upgrades

The *Gold Coast City Transport Strategy 2031: Technical Report* identifies proposed upgrades to the road network around Coomera.[51] Of relevance to this project is that there is a new Coomera North partial interchange proposed, to provide for M1 directional traffic movements to and from the north. A new Coomera South (Beattie Road) partial interchange is also proposed, providing for M1 directional traffic movements to and from the south.

Inter-Regional Transport Corridor

Running approximately north-east to south-west through the site, the IRTC is being preserved by TMR to provide a connection from Coomera to Nerang. The IRTC would be a proposed multi-modal urban arterial road connection that would:

- provide alternative access to Yatala and the large number of current and future jobs in that area. This will not only make it easier to get to and from Yatala, but also take pressure off the Pacific Motorway
- provide a stronger connection from the northern Gold Coast (including Coomera and Yatala) to the central Gold Coast. This will provide an opportunity not just for car travel but also public transport services and freight movement
- connect to the future Southern Infrastructure Corridor—a new road from the Gold Coast at Pimpama through to Ipswich (passing the new developments of Yarrabilba and Flagstone).

Council supports the staged future construction of a new multi-modal urban arterial road from Coomera to Carrara by 2031 as this would connect the growing northern suburbs with the central Gold Coast and keep local trips off the Pacific Motorway.

5.10.2. Assessment methodology for road network impacts

While several design options were prepared for the project, the traffic impact assessment in the EIS examined the proponent's preferred master plan option, as this represents the most intensive development of the site and would therefore have a greater impact upon the surrounding road network.

The subject site is the primary development site in the marina precinct and will account for a large proportion of traffic growth on Waterways Drive, Shipper Drive and Beattie Road.

[51] Gold Coast City Council, *Gold Coast City Transport Strategy 2031: Technical Report,* Gold Coast City Council, Surfers Paradise, 2013, viewed 27 November 2013, http://www.goldcoast.qld.gov.au/documents/bf/GC-technical-report-partC-2.pdf.

Growth assumptions

In order to estimate future traffic volumes on the surrounding road network, the proponent applied a 3 per cent per annum compound growth rate. While historically, the growth rate at Pacific Motorway interchanges has been higher than this, the EIS noted that the development of the Coomera Town Centre will reduce the need for local traffic to travel on the external road network. The proponent concluded that growth rates at the Foxwell Road interchange will significantly reduce as the town centre develops.

Data used for assessment

Local road network

Because the existing marine precinct on Waterway Drive comprises a range of commercial, showroom, boat storage, warehouse and factory uses as well as marina berths, the proponent examined the traffic generation by this precinct to estimate the potential traffic generation of the GCIMP.

The EIS presented traffic counts which were undertaken at the Waterway Drive/Beattie Road and Waterway Drive/Shipper Drive intersections and the results are tabulated below.

Table 5.5 Survey results of traffic generation from GCMP

Day/date	Daily trips	AM peak hour		PM peak hour	
	Total	In	Out	In	Out
Tuesday 23 March 2010	3025	172	101	96	275
Wednesday 24 March 2010	3242	179	98	48	340
Thursday 25 March 2010	2965	192	97	40	350
Total average	3077	181	99	61	322

State-controlled network

Traffic volumes at the Foxwell Road interchange were provided by TMR using data collected in November 2010.

Trip distribution

The assessment in the EIS utilised an Emme model to assign traffic distribution throughout Coomera, including the western side of the Pacific Motorway. A high proportion of traffic (75 per cent of trips) has been assigned as heading north to Foxwell Road. The remaining 25 per cent of trips are distributed south to Beattie Road.

The methodology relies on Coomera town centre and neighbouring residential catchments being established to support GCIMP. GCCC has advised that the proposed trip distribution presented in the EIS is adequate and may be considered a representation of the expected traffic assignment at the completion of GCIMP with Coomera Town Centre operating and surrounding catchments developed.

Estimated traffic generation from proposed GCIMP

The assessment presented in the EIS estimated the daily trips generated by the precinct as around 10 100. These trips have been based on proposed land uses and the results are tabulated in Table 5.6.

Table 5.6 Estimated traffic generation rates for completed development

Traffic generation rate	Daily trips	Peak hour		Peak hour	
	Total	In	Out	In	Out
Marina berths, showrooms, factory, boat, storage and ware house uses—24.3 ha	1752	102	56	34	182
Industry subdivision uses—8.1 ha	5670	454	113	113	454
Retail uses—0.58 ha	1740	70	17	87	87
Hotel—110 rooms	220	18	4	13	9
Tavern—0.15 ha	450	–	–	22	23
Education uses	300	60	15	30	45
Total	10 132	704	205	209	800

It is noted that these generation rates would be significantly lower if a regional dredge material rehandling facility was established on the site over part of the industry subdivision in the western precinct of the project.

The estimated traffic volumes for each stage of the development are outlined in Table 5.7.

Table 5.7 Estimated development traffic generation for each stage of the project

Component	Daily trips	AM		PM	
	Total	In	Out	In	Out
Stage 1	526	102	17	10	55
Stage 2	300	60	15	30	45
Stage 3	3636	88	60	146	246
Stage 4	5670	454	113	113	454
Total	**10 132**	**704**	**205**	**299**	**800**

5.10.3. Project impacts on road network

Construction traffic impacts

Construction traffic would include construction contractors, staff private vehicles and heavy vehicles used in the delivery of construction materials.

The EIS reported the worst-case scenario for daily traffic generated during construction. The results are shown in Table 5.8.

Table 5.8 Daily traffic generated during construction (worst case)

Construction phase	Number of daily trips
Construction workforce	240
Heavy vehicles	500

Construction haulage routes

There are two routes available that provide access from the Pacific Motorway to the site: a northern route along Foxwell Road and a southern route along Beattie Road (refer to Figure 5.15). The preferred haulage route is the northern route along Finnegan Way.

Figure 5.15 Proposed construction haulage routes

Access to the Pacific Motorway from the north of the site is provided along Shipper Drive and Foxwell Road. Structures along this route include a culvert crossing on Shipper Drive and a bridge structure on Foxwell Road, which both cross Oakey Creek.

Fill to be imported to the construction area would be sourced locally and transported to the site by truck and trailers with 22 m^3 capacities. The proponent is proposing to re-use excavated material from the site as fill, which would minimise the number of truck movements required. Each load will be covered to reduce loss of material and access to the site would be designed to effectively capture any material stuck to vehicles exiting the site.

Construction car parking

The proponent proposes to provide a sized hardstand area adjacent the site compound for on-site car parking for the construction workforce. The EIS reported that there would

be 120 car parks on site for construction workers and an additional allowance would also be made for any visitor vehicles requiring access to the site during construction.

Operations traffic impacts

Local road network

The assessment presented in the EIS concluded that the local intersections of Shipper Drive/Foxwell Road and Waterway Drive/Beattie Road would operate satisfactorily for the foreseeable future with the proposed development traffic.

Access to Shipper Drive is proposed for each precinct in the GCIMP via a single-lane roundabout. The eastern access has been aligned with the existing Shipper Drive/Waterway Drive intersection, while the western access has been aligned with the Shipper Drive/Ford Road intersection.

The EIS reported that each of these intersections will operate satisfactorily when the proposed development traffic is incorporated into the local road network, with minimal delays and vehicle queuing on all approaches and movements. The proponent has therefore concluded that the proposed development would not have any adverse impact upon the performance of the local road network.

GCCC's submission on the EIS and the additional information to the EIS stated that the proponent's methodology for assessing the numbers of vehicles generated by the proposed GCIMP differs from Council's methods.

GCCC reported that a traffic generation rate of 5 per 100 m² for the total use area was extracted from the GCCC's Priority Infrastructure Plan for Waterfront Industry and was applied across the GCIMP. This rate will generally cover the broad range of land uses that will form part of the GCIMP. With an assumed developable area of approximately 181 800 m² or 45 per cent of the total site area, 9090 daily trips are expected to be generated by the GCIMP. This is less than the traffic generation estimates provided by the traffic consultant.

GCCC has advised that the daily trip generation proposed by the traffic consultant is appropriate.

State-controlled roads

In the additional information to the EIS, the proponent noted that the GCIMP is proposed to be developed on a site that has been earmarked for waterfront industry for many years. Therefore, the potential impact of the proposed development on the road network should be considered in the context of what could be developed on the site as part of a self-assessable application under SPA.

The proponent provided a review of the Coomera LAP in the additional information to the EIS and identified that the following uses, which are also proposed within the GCIMP, are self-assessable and could occur without TMR referral or approval:

- shop for marine goods and services used in any water-based activity
- manufacturer's shop
- warehouse where directly associated with waterfront industry.

In addition, waterfront industry land uses are typically code assessable; therefore some waterfront industry development could occur without referral to TMR.

The additional information to the EIS noted that the original traffic impact assessment presented in the EIS was based on the overall traffic generation of 10 132 vehicles per day without taking into account the uses that are currently envisaged and accounted for. The proponent concluded that the actual traffic generation as a result of the GCIMP would be less than 4 462 vehicles per day, accounting for less than 44 per cent of the estimated traffic volume.

In accordance with TMR's *Guidelines for the assessment of road impacts of development*[52] (GARID) policy, the extent of proposed development's traffic impacts must be assessed where the development proposal is likely to result in an increase of at least five per cent of existing daily volumes on any state-controlled road section or five per cent of existing daily volumes on any individual turning movement at a state-controlled intersection.

While SIDRA analysis provided in the EIS and additional information to the EIS identified percentage impacts greater than five per cent on some turning movements at the Foxwell Road interchange, as well as the Beattie Road/Service Road intersection, these figures did not take into account the uses that are currently envisaged and accounted for.

The proponent stated that the additional land uses sought in the GCIMP to those allowable under the Gold Coast Planning Scheme, do not result in an increase in traffic above five per cent of background modelled traffic. The proponent concluded that the proposed GCIMP will not bring forward or trigger the need for road upgrade works on the state-controlled road network; and on this basis, contributions are not considered to be applicable.

It is noted that industry subdivision on the western precinct of the proposed GCIMP is predicted to generate nearly 50 per cent of the traffic loads for the area when fully developed. In the event of GCCC/GCWA purchasing this part of the site for a regional dredge material rehandling facility, the predicted traffic generation of the project would reduce substantially.

It is reported in both TMR and GCCC planning documents that the state-controlled roads at Coomera are to be upgraded to accommodate the development envisaged in the Coomera locality, particularly the Coomera town centre. Furthermore, it is also acknowledged that the Foxwell Road interchange is operating below acceptable levels of service and with future planned growth will worsen without upgrade works. The EIS noted that regardless of the proposed development, the interchange would require upgrading within the next 10 years.

TMR considered the impacts of the proposed project on the state-controlled road network will be significant, particularly in relation to the operation of the Pacific Motorway/Foxwell Road interchange. TMR advised that the increase in demand on the Pacific Motorway connection has the potential to cause safety and efficiency impacts

[52] Department of Transport and Main Roads, *Guidelines for the assessment of road impacts of development*, Department of Transport and Main Roads, Brisbane, 2013, viewed 2 December 2013, http://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Guidelines-for-assessment-of-road-impacts-of-development.aspx.

due to increased queues of stationary or slow-moving vehicles extending into the high-speed through lanes on the motorway.

Proposed mitigation measures

Local roads

The EIS reported that the contractor engaged to undertake construction of the proposed GCIMP would be required to develop a detailed localised traffic management plan to control construction traffic. The traffic management plan would be developed to manage specific intersections within and surrounding the site when required by GCCC.

Prior to any works commencing on site, the proponent has committed to preparing a dilapidation report on all bridges, structures and roads along the proposed haulage route. The traffic management plan would be submitted for approval by GCCC in the detailed design phase with a route chosen to minimise effects on the surrounding road network.

GCCC noted that when the project is fully developed, the southern leg of the roundabout at the Foxwell Road/Shipper Drive intersection has a volume to capacity ratio of 0.855, with a queue length of 89m. GCCC advised that this degree of saturation is at the higher limit for a roundabout which is 0.85 volume to capacity ratio. GCCC stated the proponent would need to provide mitigation measures on the southbound leg to maintain a degree of saturation below 0.85 volume to capacity ratio to reduce the expected queue length.

State-controlled roads

TMR asserted that the traffic and transport impact assessment provided in the EIS and the additional information to the EIS demonstrated that the proposed development will significantly impact the state-controlled road network, specifically the operation of the Pacific Motorway/Foxwell Road interchange.

Assuming traffic growth at three per cent per annum compounding for 20 years, TMR stated that the proposed development most significantly impacts the following components of the Pacific Motorway/Foxwell Road interchange:

- the southbound off-ramp—5.6 per cent increase in demand
- the northbound off-ramp—9.2 per cent increase in demand
- the eastbound overbridge—7.0 per cent increase in demand
- the westbound overbridge—4.3 per cent increase in demand
- Foxwell Road eastbound—18.9 per cent increase in demand
- Foxwell Road westbound—9.4 per cent increase in demand.

Furthermore, the increased traffic on the overbridge is also of concern to TMR as the overbridge has restricted width. TMR considered that the traffic impacts from the GCIMP would necessitate bridge duplication and associated works at the Foxwell Road interchange as mitigation measures.

TMR has calculated the proponent's contribution to the cost of upgrading the Foxwell Road interchange at $4 766 250. The proponent does not consider this figure is

warranted because it does not take into consideration the ability for the site to be developed under SPA for a number of uses which would not require referral to TMR for assessment.

5.10.4. Coordinator-General's conclusions—road network

I acknowledge the arguments put forward by the proponent in the additional information to the EIS with respect to the mitigation of impacts on the state-controlled network. However, I also note TMR's expectations that the proponent will make a proportional contribution to the impacts identified on the road network.

I consider having safe and efficient access to the road network is in the proponent's interests as business and investors expect ease of access to the site.

Requiring contributions towards the cost of the upgrade of road infrastructure is an approach adopted by TMR to ensure that the major traffic generators within the Pacific Motorway/Foxwell Road catchment equitably contribute to the upgrades that would be required to cater for this traffic growth. This approach has been applied to other developments in the catchment in the past and TMR is currently seeking contributions from other major development proposals in the area on the same basis.

Based on the advice from TMR, I consider that a financial contribution toward the upgrade of the Pacific Motorway/Foxwell Road interchange is appropriate and should be determined within an infrastructure agreement based on the results of more detailed modelling. Should an agreement not be reached, the Coordinator-General will make this decision. The principles on which the trip calculations are based should include:

- Precincts that contain land uses which are predominantly exempt, self and/or code assessable under the GCPS, *Waterfront Precinct* of the Coomera LAP are not to be included in the calculations.
- Land uses which are impact assessable under the GCPS, or are new land uses not currently contemplated by the GCPS, are to be incorporated into the trip calculations applying the highest trip generation land use and/or the subsequent next highest land use where GFA limits apply.

Marine traffic

Vessel movements

The marine traffic generated by the proposed development was estimated through surveys and a comparison of the marine traffic generated by the existing marina located in the GCMP development, immediately south of the project. The EIS noted that, as the adjoining marine industry development is of a similar nature and size to the proposed development, the survey methodology can be considered appropriate.

The initial survey was carried out between 7 am and 5 pm over five weekdays (Monday – Friday) and two weekends at the end of March 2010. An additional survey of all marine vessel movements associated with the GCMP was carried out over four days in June 2010 and included a typical weekend.

The results of the survey of the adjoining marina are summarised in Table 5.9.

Table 5.9 Summary of marine traffic survey results

Day	Number of vessels
Saturday 5 June 2010	53
Monday 7 June 2010	45
Average daily trips	**49**

The total area of the existing marine precinct is approximately 23.9 ha, including berth areas. The marine vessel generation rates in trips per ha are shown in Table 5.10.

Table 5.10 Marine vessel generation rates per hectare—existing marine precinct

Day	Number of vessels per ha
Saturday 5 June 2010	2.22
Monday 7 June 2010	1.88
Average daily trips	**2.05**

The trip generation rate was applied to the equivalent area for the proposed GCIMP development (approximately 33.3 ha). Applying the above rates yields the following marine vessel generation potential outlined in Table 5.11.

Table 5.11 Potential marine vessel traffic rates for the GCIMP

Day	Number of vessels per ha
Saturday 5 June 2010	74
Monday 7 June 2010	63
Average daily trips	**69**

The EIS concluded that the GCIMP development would generate an average of 69 trips per day, which is small when considered in the context of all of the vessels using the Coomera River.

Public and active transport

Existing public transport

The Coomera rail station is located on Foxwell Road, at the heart of the Coomera Town Centre. The northern rail services connect to Brisbane with trains departing at 30-minute intervals during business hours. Southbound services to Robina/Varsity Lakes also depart every 30 minutes.

Various bus services operate through the Coomera area with one service currently operating along Shipper Drive, directly past the project site. There are bus stops located 270 m south along Waterways Drive from the main entrance to the GCIMP. This service provides connectivity to the Coomera Town Centre and Coomera rail station as well as the Helensvale Town Centre and rail station. Services operate every

30–60 minutes through the existing marine precinct and are coordinated with rail services at Coomera and Helensvale.

Existing active transport

As identified in the extract from the Coomera LAP bicycle path network map below (Figure 5.16), there are limited bicycle paths within the vicinity of the proposed project.

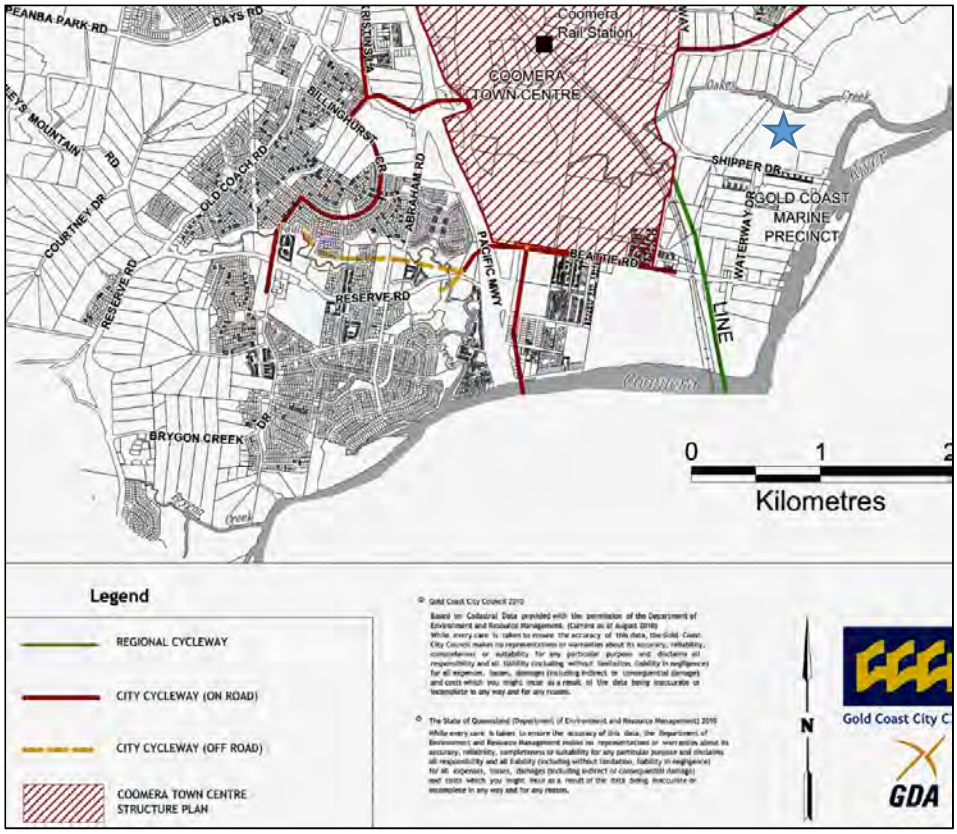

Figure 5.16 Coomera LAP map extract—bicycle path network

Car parking

As the project site is primarily used for grazing, there are no demands for car parking generated by the existing use. Visitors to the adjoining GCMP can currently use the car park provided in that development. There are a number of car parks available for the users of William Guise Foxwell Park. Typically, recreational fishers park at the end of Shipper Drive and on the verge of the road.

5.10.5. Project impacts

Marine traffic

The number of marina berths in the Coomera River is conservatively estimated at 1348. (Table 5.4 in land use outlines marina developments and berth numbers). The proposed GCIMP would add an additional 374 marina berths. The EIS reported that an additional 69 trips per day along the Coomera River can be considered a minor impact given the existing number of boats present.

Public transport

Each master plan option prepared for the development has made provision for two new bus stops to service the future public transport needs of the precinct. Bus stop locations would be subject to detailed site investigation and consultation with GCCC and Translink. The proposed GCIMP development code also requires the construction of bus stops.

Active transport

The GCIMP proposes to provide bicycle paths around the waterfront area of the precinct. Pedestrian and cycling crossing points (including bike and pedestrian ramps) would be provided at road intersections on all sides of the project site.

To encourage the use of active transport, the GCIMP has also made provision in the GCIMP development code to ensure future uses incorporate active transport facilities and end-of-trip facilities for bicycle users.

It is noted that end-of-trip facilities are mandatory under the Queensland Development Code: Mandatory Part 4.1 - Sustainable Buildings, and these requirements apply to all new major developments and major additions to major developments.

Car parking

Application of the GCCC's planning scheme recommended car parking rates to the proposed development yields a total car parking requirement of 2537 car parking spaces for the eastern precinct. A total of 2720 spaces are proposed (including on-street car parking) which exceeds this minimum requirement.

The EIS recommended that the car parking requirement for the retail and tavern land uses in the proposed GCIMP be reduced to 67 per cent and 80 per cent of the GCPS rate respectively. This is on the basis that these uses will benefit from a high proportion of walk-up trips from staff and visitors of other uses.

The EIS concluded that the proposed car parking supply is satisfactory and will not result in any adverse car parking conditions, which is a view supported by GCCC.

5.10.6. Coordinator-General's conclusions

I conclude that the EIS has adequately assessed the potential impacts of the GCIMP on the use of the Coomera River by marine vessels. The EIS demonstrated that the number of boats predicted to be generated by the project is minimal when taking into consideration the quantum of boat traffic already on the river.

I consider that the proponent has made the appropriate provisions to enable the use of public transport to access the GCIMP for this stage of the development. As detailed design progresses, I would expect the proponent to liaise with GCCC and Translink to ensure that the timing and construction of any bus stops is adequate for servicing the precinct.

Because end-of-trip facilities are a mandatory part of Queensland's Development Code, building certifiers will ensure compliance with the Code during the certification of constructed buildings process. Therefore, I have not set a condition or recommendation

with regards to delivering these facilities as I am confident they will be delivered through subsequent assessment processes.

Taking into consideration GCCC's submission on the EIS, I have concluded that the car parking rates proposed for the GCIMP are appropriate, and that the GCIMP development code will ensure this outcome.

5.11. Hazard and risk

5.11.1. Overview

Appendix 38 of the EIS presented a report on the hazards and risks related to the proposed GCIMP. The report did not comprehensively cover environmental risks as these risks have been documented elsewhere in the EIS and would be managed by the procedures outlined in the project's environmental management plan.

5.11.2. Risk assessment methodology

The hazard and risk assessment (HRA) in the EIS considered sources of risk related to natural hazards, human activity, and technological or technical issues. It predicted the potential impact of these risks to persons, the environment or the community and property. The HRA was undertaken in accordance with the principles set out in AS/NZS ISO 31000:2009 *Risk management – Principles and guidelines* (AS 3100) and the international functional safety standard AS/IEC 61508.

Potential emergency situations identified in the HRA were determined using the hazard and risk assessment methodology above, and listed in the risk register provided in the EIS.

Hazards assessed included:

- natural hazards such as flood, landslide, fire and cyclone
- spills of hazardous materials
- accidents at road crossings
- occupational hazards—manual handling, slips, trips and falls etc.

5.11.3. Results of risk assessment

The HRA provided in the EIS did not identify any of the above risks to be of a high level and therefore concluded that they would be manageable.

Natural hazards

The EIS discussed natural hazards including flood, bushfire and landslide, and included an assessment based on the existing information about the study area, including overlay mapping from the GCPS and local disaster management plans. The GCPS reflects the elements outlined in the state planning policy relating to the protection of life, property and infrastructure from natural hazards.

The EIS concluded that bushfire and landslide do not pose significant risks to the project area; however, there is some flood risk. Flood impacts over the site are discussed in detail in Section 5.2.7.

Construction risks

The risk assessment identified several construction-related risks for the proposed GCIMP, which are outlined below.

Flooding

As the project site is on low lying land that has historically been known to flood, the risk of flood waters potentially affecting construction was identified (e.g. damage to bulk earthworks stockpiles).

Dangerous goods/hazardous materials

The HRA noted that, given the nature of the construction works, there is only a small likelihood that large quantities of dangerous goods would be used or stored on site during construction. The most likely source of chemical spill during construction would be oil or diesel from plant and machinery.

Health and safety

High level health and safety risks specific to the proposed project were identified during the risk assessment, which was undertaken in accordance with AS 31000 and with reference to the *Workplace Health and Safety Act 1995*. A number of specific health and safety risks were identified, such as snake bites, heat stroke and traffic accidents.

Operational risks

Dangerous goods/hazardous materials

Utilising known materials associated with boat/ship construction, maintenance, upkeep and repair, together with those hazardous materials required for the operation and maintenance of a marina and ship lift complex, the FHA estimated the types and quantities of hazardous materials/dangerous goods which could be used at the GCIMP. The FHA noted that as development of the individual marine industry lots progresses, more details about the use of dangerous goods/hazardous materials would be provided and assessed in future development applications.

5.11.4. Proposed risk management strategies

Risk registers

The EIS noted that risk registers would be maintained at the GCIMP (during construction and operations) to record the identified hazards and their proposed/accepted mitigation techniques. The risk registers are proposed to be updated as the detailed design for each stage is progressed. Detailed occupational health and safety risk analyses of all stages of the project would also be conducted when detailed design information becomes available.

Emergency action plan

The EIS noted that emergency situations (construction and operations) at the proposed GCIMP would require effective planning and management to reduce the impacts. The proponent proposes to develop a detailed emergency action plan (EAP) specific to the project in conjunction with the appropriate emergency services authorities. Sub-plans proposed to form part of the EAP include:

- disaster management plan
- wildfire action plan
- cyclone management plan.

Additional control plans for the EAP would address the following issues:

- handling and storage of hazardous goods
- emergency incident response
- health and safety management.

Construction-specific strategies

Flooding

During construction of the GCIMP, the proponent proposes to maintain a Q10 (10 per cent probability) flooding immunity to the top of the construction bunds, where the fill from bulk earthworks will be contained for treatment. To ensure that floodwaters do not flow over the bunds, construction procedures require that all engineered fill packs must be above the 100-year flood level. Unless there is moderate to major flooding prior to the construction of the bunds, the risks from a major flood are minimal.

Operations-specific strategies

Site-based management plan

A draft SBMP was provided in the EIS and would be updated for the GCIMP operations. The SBMP would be the primary means of ensuring risk from activities conducted at a facility is maintained at an acceptable level. The objectives of the SBMP are to:

- commit and lead
- plan
- implement
- monitor, measure and evaluate including risk assessment
- hazard auditing and review.

The draft SBMP has incorporated safety aspects and integrated risk management principles through each of its elements.

Hazardous materials/dangerous goods

The proponent has advised that dangerous goods would be stored in accordance with the *Dangerous Goods Safety Management Act 2001*, Dangerous Goods Safety

Management Regulation 2001 and relevant Australian Standards, such as AS/NZS 1940:2004 *The storage and handling of flammable and combustible liquids*.

Chemical use will be limited wherever possible, and the minimum practicable volume stored on site. Those chemicals that are required for operations would be stored in a suitable on-site bunded area with appropriate spill equipment available.

It is proposed that both unleaded petrol and diesel fuel will be stored within the GCIMP for boat refuelling. The quantities of unleaded petrol and diesel fuel are expected to be above the threshold quantity for a Large Dangerous Goods Location but are not expected to exceed the prescribed quantity for a major hazard facility.

The EIS noted that any business in the GCIMP that exceeds the fuel storage thresholds for ERA 11—Fuel Storage will need to obtain statutory approval.

Fuel would be transported to the site by an approved road tanker, which would comply with the *Australian Code for the Transportation of Dangerous Goods by Road and Rail* (6th Edition, 1998). Other hazardous materials/dangerous goods would be transported in accordance with the appropriate standards.

With regards to the flammable and combustible liquids that would be held by individual businesses within the GCIMP, the proponent advised that an inventory of these materials will be prepared and made available to the emergency services.

Health and safety

Management and mitigation measures have been proposed for snake bites, heat stroke, traffic accidents. Internal workplace health and safety audits of the management system, hazard information and records, shift processes, safety measures and staff personal protective equipment would be conducted annually. The audit would include a review of all complaints and incidents for the audit period and maintained for review purposes.

5.11.5. Coordinator-General's conclusions

Based on the information provided in the EIS, I conclude that the proponent has conducted an appropriate hazard and risk assessment for the proposed project. I note that further assessments would be undertaken during the detailed design phase.

I consider that the strategies and processes proposed to manage the hazards and risks of the GCIMP during construction and operations are consistent with well-regarded standards and would be adequate to manage issues at GCIMP, should the need arise.

The fact that the proponent has committed to consulting with the appropriate emergency services agencies to finalise the hazard and risk assessment and documentation provides further assurance that the GCIMP would be properly managed during construction and operations.

6. Matters of national environmental significance

This section of the report addresses the requirements of the Queensland Government's assessment as specified by Schedule 1 of the bilateral agreement and Part 13 of the State Development and Public Works Organisation Regulation 2010.

6.1. Project assessment and approvals

On 8 February 2008, the proponent referred the project to the Commonwealth Environment Minister (referral number 2008/4002) for a determination as to whether the project would constitute a 'controlled action'[53] with respect to potential impacts on 'matters of national environmental significance' (MNES) under sections 75 and 87 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act).

The EPBC Act establishes an Australian Government process for assessing environmental impacts and approving proposed actions that are likely to have a significant impact on MNES or on Commonwealth Government land.

On 27 April 2008, the minister determined that the project is a 'controlled action' under the EPBC Act, and therefore it must be assessed for approval under the EPBC Act. The relevant controlling provisions under the EPBC Act are:

- sections 16 and 17A wetlands of international importance
- sections 18 and 18A listed threatened species and ecological communities
- sections 20 and 20A migratory species protected under international agreements

The Australian Government has accredited the State of Queensland's EIS process, conducted under the SDPWO Act, under a bilateral agreement between the Australian and Queensland governments. Under the agreement (made under section 45 of the EPBC Act), if a controlled action is a coordinated project for which an EIS is required under the SDPWO Act, then the project does not require assessment under Part 8 of the EPBC Act. The agreement enables the EIS to meet the impact assessment requirements of both Commonwealth and Queensland legislation.

Under Part 4 of the SDPWO Act and section 36 of the State Development and Public Works Organisation Regulation 2010 (SDPWO Regulation), the Coordinator-General must ensure the assessment report evaluates all relevant impacts that the action has, will have, or is likely to have, and provide enough information about the action and its relevant impacts to allow the minister to make an informed decision whether or not to approve the action under the EPBC Act.

The controlled action may be considered for approval under section 133 of the EPBC Act, once the minister has received the Coordinator-General's EIS evaluation report (prepared under section 35 of the SDPWO Act).

[53] For a definition of 'controlled action', refer to the Glossary on page 189 of this report.

6.2. Description of the proposed action

6.2.1. Overview

Harbour Island Pty Ltd proposes to develop an integrated mixed use marine industry facility on the Coomera River, 20 kilometres (km) north of Surfers Paradise. This development would expand upon the existing marine precinct south of the proposed development site and has been designed to accommodate production facilities, suppliers and service industries to support integrated growth of the marine industry.

The development is proposed on approximately 63.5 hectares (ha) of land within the Coomera Marina Precinct. Approximately 42 ha of the site would be developed for marine industry and mixed use (e.g. display and showrooms, corporate office space, small scale light industry and services and restaurants and retail outlets). The site would include an 11.5 ha internal marina, a 7 ha external marina facility and 2.2 ha dredge material disposal area.

The remaining 4.9 ha along the northern and western boundary of the proposed development would be retained within a 40 m setback to conserve the existing natural values along Oakey Creek.

6.2.2. Location

The proposed GCIMP development is located within the mid estuarine reach of the Coomera River catchment, approximately seven km from the Gold Coast Broadwater which makes up the southern portion of Moreton Bay Marine Park and Ramsar wetland. The Coomera River catchment covers a total area of 489 square kilometres (km^2) which accounts for 2.3 per cent of the total catchment area of creeks and rivers that discharge into Moreton Bay. The Coomera River is one of four major rivers that drain into the Gold Coast Broadwater. The tidal rivers that flow into the Broadwater contribute to a significant proportion of the tidal volume of water within the Broadwater system, with the Pimpama and Coomera Rivers accounting for 85 per cent of the tidal prism.

Dominant land uses within the Coomera River catchment include agriculture in the upper to middle reaches and urban development in the lower catchment area[54]. The estuarine reaches of the Coomera River are considered to be largely urbanised and extensively modified through the development of residential canal estates and marina, golf course and peri-urban developments[55]. There are a number of marina developments along the river that contribute to a high volume of vessel traffic. Existing marina development in the Coomera River include Gold Coast City Marina, Hope Harbour Marina, Hope Island Resort Marina, Coomera Waters Marina, Sanctuary Cove Marina, River Links Marina which provide a total 1070 wet marina berths. The types of vessels using the river include small recreational vessels (jet skis, wave-runners), catamaran and yachts, cruisers and house boats as well as commercial fishing boats and trawlers.

[2] Healthy Waterways 2010, Ecosystem Health Monitoring Program, viewed 20 November 2013, http://www.healthywaterways.org/EcosystemHealthMonitoringProgram/2010ReportCardResults/CatchmentResults/SouthernCatchments/Pimpama/CoomeraRiversCatchmentandEstuary.aspx

[55] Wolanski E 2013, Estuaries of Australia in 2050 and Beyond – A synthesis, Netherlands, Copernicus, 2013

Whilst being largely developed the Coomera River catchment is considered to be in good health. Between the 2012 to 2013 reporting period, the Coomera Catchment area and Coomera estuary received a 'B' grade for the Healthy Waterway Report Card, showing improvements in algae concentrations and continued excellent values for turbidity and dissolved oxygen. These values indicate that the overall water quality in the Coomera River is generally good with conditions meeting all set ecosystem health values in most of the reporting region; and with most key processes functional and critical habitats intact. In addition to good water quality the lower estuarine reaches are also considered to retain natural morphological and floristic characteristics which support significant fisheries and estuarine habitat. The habitats in the lower reaches of the river around Coomera Island and the lower section of the Broadwater are considered to have high ecological significance and are included within the boundaries of the Moreton Bay Ramsar site.

6.2.3. Existing site

The site is located within an area that has been designated through local/state government planning for marine industry use and there is already a number of existing marine industry developments in the immediate area. Existing marine industry developments include the Gold Coast City Marina and ship yard facilities adjacent to the proposed GCIMP development. Operational activities undertaken within these marine industry areas include steel and fiberglass boat fabrication, boat and accessory repairs and marina operations. The northern boundary of the site is Oakey Creek which flows into the Coomera River via a direct channel to the north of Foxwell Island and a secondary channel between Foxwell Island and the development.

The majority of the existing site includes vegetation communities that have been fragmented or modified by grazing and associated historical clearing of overstorey vegetation. Fragmented remnant vegetation communities are mostly restricted to the riparian zone along Oakey Creek and the western and southern boundaries adjacent to Shipper Drive. Ground-truthing surveys undertaken for the EIS indicated that a large proportion of the site (36.85 ha) is characterised by low closed pasture with a scattered trees/paddock mosaic.

There are no waterways present across the site and standing freshwater is typically absent with the exception of the freshwater dam in the western section of the site.

Approximately 26 ha of the site is periodically inundated by tidal waters which has resulted in the formation of semi-perennial ponds and submerged estuarine wetlands across the site. The central area of the site contains a large saline/brackish semi-permanent open wetland which is largely influenced by rainfall and tidal cycles. Ground-truthing surveys indicated that a large proportion of wetland vegetation communities on the site (27.53 ha) are characterised as estuarine wetland vegetation and that a small area of vegetation communities (3.48 ha) are characterised as palustrine wetland vegetation.

The site contains a low abundance of flowering trees, with flowering species mostly limited to scattered blue gum, grey ironbark, paperbark, bottlebrush and acacia in the south western corner of the site. There is also low abundance of fruiting trees, with

fruiting trees restricted to dry rainforest species including tuckeroo and kamala, which are most abundant on the area west of Shipper Drive. Grazing and associated historical vegetation clearing on site have resulted in limited structural diversity of understorey and ground cover species. Forested areas containing dense ground strata and high structural variability are generally restricted to the vegetation communities west of Shipper Drive which contain denser areas of regrowth, grassland and weed shrubland.

6.2.4. Construction

Construction would involve vegetation clearing of up to 58.69 hectares (ha). Major earthworks would be undertaken to fill 42 ha (65 per cent of the site) to 3.4 m Australian Height Datum (AHD), and for the construction of the revetment walls. This would require approximately 1.1 million m^3 of fill material. Approximately 515,000 m^3 of fill material (general fill and engineering fill) would be sourced from local external sources (for example nearby development in the Coomera Town Centre) and transported to the site using trucks and trailers.

Approximately 83,000 m^3 of material would be used to construct temporary construction bunds and preloading. Material used for the construction of the temporary bunds would be sourced from topsoil stripped during site preparation works.

Construction of the internal marina and a portion of the channel widening would be undertaken using dry excavation techniques. These works would be undertaken using excavators, trucks and land-based machinery. The total volume of material to be removed via dry excavation techniques is expected to be in the order of approximately 531,000 m^3.

The internal marina basin would be excavated to an initial depth of -8 m AHD to accommodate the disposal of acid sulfate material from other areas of the site and would then be filled to a final depth would be -4 m AHD. Upon completion of dry excavations the marina would be allowed to naturally fill with groundwater and would be connected to the Coomera River.

Dry and capital dredge material would be placed in a treatment area, where it would be dried and treated for acid sulphate soils until suitable for reuse as construction fill material. Any untreated material considered to be unsuitable for reuse would be disposed in deep excavations of the marina channel or to an appropriately licensed landfill.

The remainder of the channel widening works and the construction of the external marina would be dredged using either via a drag line or a long reach excavator set up on a perimeter bund or barge. The proposed works would involve widening the channel between Foxwell Island and the site by 65 m and deepening the entrance channel and marina basin footprint to a depth of -4 m AHD. The volume of material to be removed from this area is expected to be in the order of approximately 119 000 m^3.

6.2.5. Operation

The EIS reported that the external and internal marinas would require regular maintenance dredging to maintain a navigable depth for vessels. These areas are expected to have an annual sediment deposition rate of 5,000 m^3. Maintenance dredging operations would be undertaken at 10 year intervals, and would each remove approximately 50,000 m^3 of material. A cutter suction dredge would be used for maintenance dredging operations.

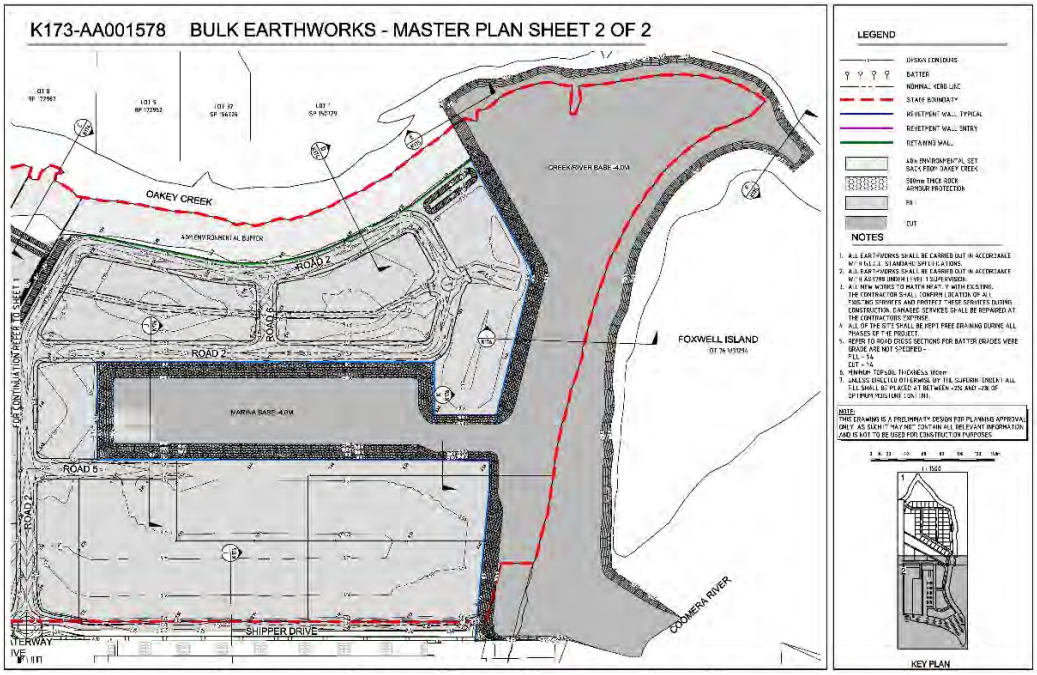

Figure 6.1 Maintenance dredging footprint

Dredge material generated during maintenance dredging is to be placed in settlement ponds in the dredge material treatment facility proposed in the western precinct. The dredge material would be pumped to the settlement ponds in the designated dredge material treatment facility via a pipeline along Shipper Drive. This facility will serve as a dewatering and short-term storage area for dredged material during the maintenance dredging campaigns.

The dredge material would be dewatered progressively and the tailwater would be treated via a series of settlement ponds for the removal of suspended solids. Following the settlement of the dredge material within the treatment pond, tailwater would be immediately directed to a tailwater treatment system. Treated tailwaters are to be discharged to Oakey Creek via a single release point. The extent of maintenance dredging can be seen in Figure 6.1.

6.2.6. Environmental management plans

Draft environmental management plans for acid sulfate soils, construction management and site operations were submitted in the EIS. The proponent would be required to update the management plans following detailed design and before construction commences.

Amended management plans that address the specific recommendations and conditions mentioned in this report are to be prepared through subsequent applications. It is expected the amended management plans would address in detail issues such as:

- air quality
- acoustic quality
- water quality
- flora and fauna management
- acid sulfate soils management
- location, type, quantity etc. of chemicals
- emergency management
- environmental risk management.

Implementation of finalised management plans would satisfy the commitments made by the proponent in the EIS process and would ensure the compliance of approval conditions.

6.2.7. Potential impacts and mitigation

Marine water quality

The proponent has committed to implement a range of control measures to manage the dispersion of suspended sediments during the capital and maintenance dredging works. The timing and staging of dredging works would be managed to assist in confining the resulting turbid waters. Silt curtains would be installed around the disturbance areas to contain the dredge plume generated by these works.

The proponent has also committed to implement adaptive management measures, including a risk-based water quality monitoring program, to ensure dredging operations would be responsive to changes in water quality.

Investigations have indicated that the sediments are uncontaminated; therefore, the risk of mobilising metals and other contaminants during capital works is considered to be low.

Stormwater runoff and marina activities would be managed during operations to reduce contamination of sediment in the marina basins and prevent the potential dispersion of sediment-associated contaminants during maintenance dredging operations. The marina basins have also been designed to maintain good water circulation and tidal flushing, which would assist in reducing stagnation and the build-up of pollutants within the marina basins.

Operational works such as boat building and repairs and washdown activities are to be undertaken in bunded areas away from surface water runoff and wastewaters from these activities are to be appropriately managed to reduce impacts on water quality.

The EIS indicated that impacts from sewage discharge, wastewater and garbage would be minimised through the provision of common user facilities at the marina. The risk of litter and debris entering waterways surrounding the site is to be managed through stormwater management, provision of bins and implementation of educational signage.

As the entire site is below 5 m AHD, construction activities would be expected to disturb acid sulfate soils. Preliminary soil sampling indicated that acid sulfate soils may potentially be exposed through direct excavation and/or groundwater drawdown. All construction activities are to be undertaken in accordance with an acid sulfate soil management plan to ensure that receiving waterways and groundwater are not affected by acidic material. Acid sulfate soils are to be managed by treatment with lime to neutralise their equivalent net acid generating potential.

Groundwater drawdown management measures including recharge trenches would be implemented along the boundaries of the marina excavation areas to reduce the exposure of acid sulfate soils. All ponded surface waters and groundwater seepage within excavation areas, acid treatment or any water quality control structures would be tested and treated prior to any dewatering activities. No water from dewatering activities is to be released into the recharge trenches or receiving waterways other than waters meeting the performance criteria specified in the Acid Sulfate Soils Management Plan.

Treatment beds and treated material stockpiles would be contained within bunded containment areas away from areas affected by surface water runoff, to prevent the release of acid leachate to receiving waterways.

Conditions stated in this report include requirements for:

- implementation of a Receiving Environment Monitoring Plan commencing at least 18 months prior to commencement of works to determine appropriate water release criteria
- management of construction and dredging works to minimise release of acid sulfate material and suspended sediments to marine waters
- management of operations, including stormwater and ship-sourced pollutants, to minimise to marine waters
- facilities used for storing environmentally hazardous substances within the project site are designed and located to ensure that material remain secure at all times and that secondary containment is provided to prevent releases to the environment from spillages of leaks
- ensuring that all vessel maintenance and cleaning activities are undertaken away from areas where contaminants can be released into any receiving water
- provision of common user facilities within the marina for the handling and disposal of ship-sourced pollutants, including oil, garbage and sewage

Buffer to Oakey Creek

The preferred master plan for the GCIMP proposes a minimum 40-metre vegetated setback along Oakey Creek. This land would create a 4.9 ha buffer to protect the environmental values associated with the creek from the impacts of the proposed development.

Weed management and rehabilitation works within the buffer area have been proposed to remediate and enhance the habitat within the zone following disturbance created by construction works.

Conditions stated in this report include requirements for:

- the rehabilitation and long-term protection of the Oakey Creek buffer area including the replanting of native species compatible with the grey-headed flying-fox and wallum sedgefrog
- ensuring that any EPBC listed species identified during are construction works are appropriately relocated to prevent injury.
- control of feral species including cats, foxes and pigs
- monitoring and remediation of any project-related bank erosion associated with increased flood flows in Oakey Creek.

Marine fauna

The EIS indicated that the suspended sediment plumes generated by proposed capital and maintenance dredging works are expected to result in a localised loss of 1.23 ha of seagrass from the seagrass beds at Foxwell Island and 800 m downstream from the project site. These seagrass beds are considered to provide potential foraging habitat to marine fauna such as green turtles, based on the species of seagrass present in these areas. Previous sightings of turtles in the area suggest utilisation of foraging habitat within the Coomera River, although potentially at low levels.

The proposed development would increase the number of vessels using the Coomera River, which may increase the risk of boat strike to marine megafauna including turtles, dugongs and dolphins. These species may also be impacted by underwater noise generated by pile driving and dredging activities.

Noise mitigation measures would include commencing pile driving activities with a soft start, using pile driving methods that generate less noise, and the use of dredge equipment that generate a lower level of noise than other dredging equipment.

Conditions recommended and stated in this report include requirements for:

- further surveys be undertaken to determine the extent of seagrass prior to commencing dredging operations
- an offset for any residual significant impacts on seagrass attributable to the proposed development
- measures to reduce underwater noise impacts on marine fauna
- maintenance dredging to be only undertaken using a cutter suction dredge

- a fauna spotter to be present during all dredging to monitor for marine mega-fauna. Dredging activities would be halted where marine mega-fauna are observed within 100 m from the dredge
- control of invasive marine pests.

I have recommended a condition requiring the proponent to provide signage at the GCIMP, informing readers about EPBC listed threatened and migratory species, and providing advice about how to minimise impacts on MNES from boat strike and litter.

6.3. Listed threatened species and ecological communities

6.3.1. Threatened flora and ecological communities

In deciding whether or not to approve the proposal for the purposes of a subsection of section 18 or section 18A of the EPBC Act, and what conditions to attach to such an approval, the Commonwealth Environment Minister must not act inconsistently with:

- Australia's obligations under:
  - the Biodiversity Convention (CBD)
  - the Convention on Conservation of Nature in the South Pacific (Apia Convention)
  - Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), or
- a recovery plan or threat abatement plan.

6.3.1. Threatened flora and ecological communities

An ecological community is a naturally occurring group of plants, animals and other organisms that are interacting in a unique habitat. Its structure, composition and distribution are determined by environmental factors such as soil type, position in the landscape, altitude, climate and water availability. An ecological community becomes threatened when it is at risk of extinction.

Threatened ecological communities

A search of the EPBC protected matters database identified one threatened ecological community (TEC) within a five km radius of the proposed development site. This community the lowland rainforest of subtropical Australia which is listed as critically endangered under the EPBC Act, was added to the EPBC Act threatened species list after the Controlled Action decision date and therefore cannot be considered in this assessment. Flora surveys undertaken for the EIS did not identify any threatened ecological communities. No TECs will be directly or consequentially impacted by the proposed action.

Threatened flora

Threatened flora are plants that have assessed as being as being at risk extinction. The EPBC Act lists flora considered to be threatened. Their recovery is promoted using

conservation advice, recovery plans, threat abatement plans and the EPBC Act's assessment and approval provisions.

A search of the EPBC protected matters database identified 18 flora species listed as threatened under the EPBC Act as potentially occurring within five km of the project site. These species are provided in Table 6.1.

Table 6.1 Threatened flora species potentially occurring in the project area

Common name Scientific name	EPBC Act status	NC Wildlife Regulation status	Likelihood of Occurrence
Dwarf heath casuarina *Allocasuarina defungens*	Endangered		Species or species habitat may occur within area
Hairy-joint grass *Arthraxon hispidus*	Vulnerable	Vulnerable	Species or species habitat may occur within area
Marbled Balogia *Baloghia marmorata*	Vulnerable	Vulnerable	Species or species habitat may occur within area
Heart-leaved bosistoa *Bosistoa selwynii*	Vulnerable		Species or species habitat likely to occur within area
Three-leaved bosistoa *Bosistoa transversa*	Vulnerable		Species or species habitat likely to occur within area
Native Jute *Corchorus cunnighamii*	Endangered	Endangered	Species or species habitat likely to occur within area
Stinking cryptocarya *Crytocarya foetida*	Vulnerable	Vulnerable	Species or species habitat may occur within area
Leafless tongue-orchid *Cryptostylis hunteriana*	Vulnerable		Species or species habitat may occur within area
Floyd's walnut *Endiandra floydii*	Endangered	Endangered	Species or species habitat likely to occur within area
Wandering pepper-cress *Lepidium peregrinum*	Endangered		Species or species habitat may occur within area
Macadamia nut *Macadamia integrifolia*	Vulnerable	Vulnerable	Species or species habitat likely to occur within area
Lesser swamp-orchid *Phaius australis*	Endangered	Endangered	Species or species habitat likely to occur within area
Mt berryman phebalium *Phebalium distans*	Critically endangered	Endangered	Species or species habitat may occur within area

Common name Scientific name	EPBC Act status	NC Wildlife Regulation status	Likelihood of Occurrence
Shiny-leaved condo *Planchonella eerwah*	Endangered	Endangered	Species or species habitat likely to occur within area
Plectranthus habrophyllus	Endangered	Endangered	Species or species habitat likely to occur within area
Spiny Gardenia *Randia moorei*	Endangered	Endangered	Species or species habitat likely to occur within area
Siah's Blackbone *Streblus pendulinus*	Endangered		Species or species habitat likely to occur within area
Minute orchid *Taeniphyllum muelleri*	Vulnerable		Species or species habitat likely to occur within area

Whilst these species are listed as potentially occurring within the project area, vegetation assessments indicated that the site does not provide conditions to support these species with the exception of lesser swamp orchid. The EIS indicated that habitat that is suitable for the lesser swamp orchid may be present within the area to the west of shipper drive.

Vegetation surveys were undertaken between July to August 2008 and repeat surveys were undertaken between July to August and September to October 2011. No species of flora scheduled as threatened under the EPBC Act were recorded during these surveys.

Lesser swamp orchid

The lesser swamp orchid is commonly associated with coastal wet heath/sedgeland wetlands, swampy grassland or forest, and often where broad-leaved paper bark or swamp mahogany are found. The lesser swamp orchid has been recorded on the Gold Coast at Jacobs Well, approximately nine km north-east of the proposed development site. While the species is restricted in distribution, suitable habitat is considered to be widespread in the region.

The recommended survey methodology for identifying the presence of this species is to conduct surveys in the spring as this species can only be distinguished from other swamp orchids by characteristics of its flowers. Flora surveys undertaken between September and October of 2011 would therefore be considered sufficient for confirming the absence of this species.

Key threats to this species include illegal collection, loss of habitat, inappropriate fire regimes, invasive weeds and grazing and trampling by feral pigs and domestic stock animals.

As the site has been heavily grazed by cattle, this species is considered unlikely to occur within the areas proposed to be cleared on the site. Cattle are known to eat the flowering parts of orchids and severely impact on orchid microhabitats through trampling. The areas of the site considered to potentially provide suitable habitat for

this species would be retained within the 40 m buffer. The quality of habitat within these areas would also be enhanced through revegetation works and weed removal.

While a recovery plan has not been progressed beyond draft form, the New South Wales government has listed a number of priority actions aimed at ensuring the recovery of this species. As no population of lesser swamp orchids has been identified at the site, the project is not likely to be inconsistent with identified priority actions for the species.

A threat abatement plan that lists the lesser swamp orchid as a species of interest is the *Threat Abatement Plan for Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs 2005*[56]. The abatement plan sets out a national framework to guide the coordinated implementation of the objectives and actions considered necessary to manage the environmental damage caused by feral pigs to species and ecological communities affected by the process.

Feral pig occurrence, abundance and distribution maps indicate that pigs are occasionally present and widespread in the south east Queensland region. The presence of feral pigs on the site is considered to be low based on mapping[57] and the general paucity of standing freshwater and dense vegetation on the site. The proponent has committed to implement a weed and pest management plan to assist in protecting habitat values within the buffer.

The project would not result in unacceptable impacts to the lesser swamp orchid and would not be inconsistent with the threat abatement plan, through ensuring that suitable area of habitat are retained within the 40 m buffer and the adequate management of weeds and pests.

I consider that the project would have a net benefit to the species through ensuring that areas of potentially suitable habitat are retained and improved within the 40 m buffer and the adequate management of weeds and pests on the site.

I state conditions in the report requiring the proponent to implement a 40 m setback from Oakey Creek. I have also conditioned the proponent to ensure that setback area is adequately rehabilitated and revegetated to enhance and maintain habitat values.

6.3.2. Threatened fauna

Threatened fauna are species of animals that are assessed as being at risk of extinction. The EPBC Act lists threatened species of fauna and promotes their recovery using expert scientific advice, recovery plans, threat abatement plans and assessment and approval provisions.

A total of 138 species of fauna was recorded within the development site during surveys including 100 species of bird, 8 species of reptile, 7 species of amphibians and 23 species of mammal. Eight of the recorded species, including 7 mammals and one

[56] Department of the Environment and Heritage, 2005, *Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs*, Department of the Environment, Canberra, viewed 8 December 2013, http://www.environment.gov.au/resource/threat-abatement-plan-predation-habitat-degradation-competition-and-disease-transmission

[57] West, P. 2008, *Assessing invasive animals in Australia 2008*, National Land and Water Resources Audit and Invasive Animals CRC, Canberra, viewed 8 December 2013, http://www.feral.org.au/assessing-invasive-animals-in-australia-2008/

toad are considered to be non-native and/or pest species. Of the total number of fauna identified only one species listed as threatened under the EPBC Act, the grey headed flying-fox (vulnerable), was recorded. Whilst no other EPBC listed threatened species were identified in surveys, it was considered that the site may provide suitable habitat for a range of threatened fauna. In addition to potential habitat within the development site, it is considered that habitat for a range of threatened species may be impacted adjacent to the site.

Field surveys were undertaken by appropriately qualified personnel on the site between 2008 and 2012 to determine the presence of any threatened fauna species. These surveys were undertaken over a number of seasons and at various times of the day. Initial surveys were undertaken between July and August 2008 and subsequent surveys were undertaken between September and October 2011. Incidental sightings were also undertaken during non-faunal surveys between 2008 and 2012.

Additional opportunistic surveys were also undertaken during other survey works, focusing on wader bird species that use of the central wetland and adjacent intertidal areas. These additional surveys were undertaken during December 2011 and January, March, April and May 2012. The survey methodologies and survey effort undertaken by the proponent to identify the presence of threatened bird species (as described in section 8.1 of the EIS) is considered to be appropriate and in accordance with the survey guidelines described in the 2006 *Wildlife Conservation Plan for Migratory Shorebirds*[58].

Terrestrial fauna

Avifauna (birds)

A search of the EPBC protected matters database identified 22 species of bird that are listed as threatened under the EPBC Act that potentially occur within five km of the project site. Twelve of these species are albatross or petrel. The identified albatross and petrel species of are considered unlikely to use the site, as these bird species typically forage at sea. The other ten species of bird identified by the database are provided in Table 6.2.

[58] Australia Department of Environment and Heritage 2006, Wildlife Conservation Plan for Migratory Shorebirds, Commonwealth of Australia, Canberra, viewed 7 December 2013, http://www.environment.gov.au/system/files/resources/3846c029-620a-4db9-a385-4ec290beee62/files/shorebird-plan.pdf

Table 6.2 Threatened bird species with the likelihood to occur in the project area

Common name Scientific name	EPBC status	NC Wildlife Regulation status	Likelihood of occurrence
Regent honeyeater *Anthochaera Phrygia*	Endangered, migratory	Endangered	Species or species habitat may occur within area
Australasian bittern *Botaurus poiciloptilus*	Endangered		Species or species habitat known to occur within area
Coxen's fig-parrot *Cyclopsitta diophthalma coxeni*	Endangered	Endangered	Species or species habitat likely to occur within area
Eastern Bristlebird *Dasyornis brachypterus*	Endangered	Endangered	Species or species habitat may to occur within area
Red Goshawk *Erythrotriorchis radiates*	Vulnerable	Endangered	Species or species habitat likely to occur within area
Southern Squatter Pigeon *Geophaps scripta scripta*	Vulnerable	Vulnerable	Species or species habitat likely to occur within area
Swift Parrot Lathamus discolour	Endangered	Endangered	Species or species habitat may to occur within area
Southern black-throated finch Poephila cincta cincta	Endangered	Endangered	Species or species habitat may to occur within area
Australian painted snipe *Rostratula australis*	Vulnerable, migratory	Vulnerable	Species or species habitat likely to occur within area
Black-breasted button-quail *Turnix melanogaster*	Vulnerable	Vulnerable	Species or species habitat likely to occur within area

Whilst these species are listed as potentially occurring within five km of the project area, surveys of the site indicated that there is limited habitat to support these species. Habitat assessment indicated that:

- The site is largely absent freshwater wetland habitat, which is the preferred habitat of Australian painted snipe and Australasian bittern. The Australian painted snipe and Australasian bittern typically prefer freshwater wetland habitat, however are known to utilise saline/brackish wetlands. Surveys of the small areas of freshwater wetland vegetation on the site indicated that these areas did not contain any standing freshwater. Standing freshwater on the site is limited to the constructed dam in the western section of the site. The Australasian bittern are rarely recorded

in Queensland and possibly survives only in protected areas such as the Cooloola and Fraser regions[59].

- The low abundance of prolific flowering and fruiting trees on the site would limit the use of the site by the regent honeyeater, swift parrot and the Coxen's fig parrot. The swift parrot is known to occur in small numbers in south east Queensland, including the Gold Coast region during its non-breeding season. The Coxen's fig parrot has been recorded in Lamington National Park approximately 66 km from the proposed development site.
- The site does not contain any tall trees suitable for red goshawk nesting. Nests of other raptor species including the white-bellied sea eagle were typically observed in blue gum trees proximate to the site. Surveys did not identify any semi-evergreen vine thickets and vine forest communities on the site, which are the preferred habitat of the black-breasted button-quail and significant component of the vegetation mosaics frequented by red goshawks. Like the Coxen's fig parrot the black-breasted button-quail has been recorded in Lamington National Park.
- The presence of heavily grazed paddock and low diversity of seeding grasses on the site would reduce the likelihood of the southern-black throated finch using this site as this species is rarely found in modified habitats that are absent of suitable seeding grasses. The likelihood of this species occurring is also considered to be low as has not been recorded from Brisbane and its surrounds since the 1930s.
- The limited structural diversity of understory and ground cover species within the fragmented vegetation communities on the site would limit the use of the site by the eastern bristlebird. The eastern bristle bird has been recorded in Lamington National Park.

The survey methodologies and survey effort undertaken by the proponent to identify the presence of threatened bird species (as described in section 8.1 of the EIS) is considered to be appropriate and in accordance with the *2010 Survey Guidelines for Australia's Threatened Birds*[60].

No species of avifauna listed as threatened under the EPBC Act were identified during field surveys. Whilst it is recognised that some species may have not been detected due to their rarity, elusive nature and/or sporadic use of habitat, the habitat assessment undertaken by the proponent indicates that there is limited suitable habitat, which reduces the likelihood of the species identified in Table 6.2 occurring on the site.

Most of the areas on the site that contain potentially suitable habitat for the species provided in Table 6.2, in particular the areas containing flowering and fruiting trees and standing freshwater are proposed to be retained within natural vegetation area in the western section of the site and the 40 m setback from Oakey Creek. These buffer areas would also be rehabilitated to enhance the habitat values and connectivity through the removal of weed species and re-vegetation works.

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[59] Jaensch, R. 2005. *Personal Communication, June 2005.* Cited in Department of the Environment (2013). *Botaurus poiciloptilus* in Species Profile and Threats Database, Department of the Environment, Canberra, *viewed 9 December 2013, http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1001*

[60] Department of the Environment, Water, Heritage and the Arts, 2010, *Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act*, Department of the Environment, Canberra, viewed 20 November 2013, http://www.environment.gov.au/system/files/resources/107052eb-2041-45b9-9296-b5f514493ae0/files/survey-guidelines-birds.pdf

Reptiles

A search of the EPBC protected matters database identified two terrestrial reptile species that are listed as threatened under the EPBC Act as potentially occurring within five km of the project site. These species are provided in Table 6.3.

Table 6.3 Threatened reptile species with the likelihood to occur in the project area

Common name Scientific name	EPBC status	NC Wildlife Regulation status	Likelihood of occurrence
Three-toed snake-tooth skink *Coeranoscincus reticulates*	Vulnerable	-	Species or species habitat may to occur within the area
Collared delma *Delma torquate*	Vulnerable	Vulnerable	Species or species habitat may to occur within the area

Whilst these species are listed as potentially occurring within five km of the project area, field surveys indicated that the project site provides limited habitat to support these species. The collared delma requires suitable micro-habitats including exposed rocky outcrops, which are absent on the site. The site also has limited areas with a deep leaf litter layer and/or debris (fallen logs etc.) which are the habitat requirement of the three-toed snake-toothed skink.

The survey methodologies and survey effort undertaken by the proponent to identify the presence of threatened reptile species (as described in section 8.1 of the EIS) is considered to be appropriate and in accordance with the 2011 *Survey Guidelines for Australia's Threatened Reptiles*[61].

No species of reptile listed as threatened under the EPBC Act were identified during field surveys.

Potentially suitable habitat would be retained within the natural vegetation area and 40 m setback from Oakey Creek. The potential habitat in these buffer areas would also be enhanced through removal of weed species and revegetation works. These mitigation measures are not inconsistent with the conservation advices for the collared delma and the three-toed snake-toothed skink.

Amphibians (frogs)

A search of EPBC protected matters database identified one species of frog, the giant barred frog (*Mixophyes iterates)* as potentially occurring within five km of the project site. This species is listed as endangered under the EPBC Act.

Based on information provided on the EPBC Act Species Profile and Threats Database, the development site is also considered to provide important breeding and non-breeding habitat for the wallum sedgefrog (*Litoria oblongurensis*) in association

[61] Department of Sustainability, Environment, Water, Population and Communities, 2011, *Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the EPBC Act*, Department of the Environment, Canberra, viewed 20 November 2013, http://www.environment.gov.au/system/files/resources/eba674a5-b220-4ef1-9f3a-b9ff3f08a959/files/survey-guidelines-reptiles.pdf

with the presence of Queensland regional ecosystems 12.3.5 and 12.2.15. The wallum sedgefrog is listed as vulnerable under the EPBC Act.

Habitat assessment indicated that the site does not provide suitable habitat for the giant barred frog which requires permanent freshwater streams for breeding.

The areas of vegetation mapped as regional ecosystem 12.3.5 on the site were not identified as providing habitat requirements for the wallum sedgefrog. These areas were devoid of standing fresh water and were identified as having a low diversity of ground cover with the lower strata being predominantly composed of saltmarsh species and/or pasture grasses. Ground-truthing surveys also indicated that the area mapped regional ecosystem 12.2.15 is subject to tidal inundation which makes this area unsuitable for the wallum sedgefrog.

The survey methodologies and survey effort undertaken by the proponent to identify the presence of threatened frog species (as described in section 8.1 of the EIS) is considered to be appropriate and in accordance with the 2010 *Survey Guidelines for Australia's Threatened Frogs*[62].

Based on habitat assessment and extensive survey effort, the loss of 3.48 ha of remnant regional ecosystem 12.3.5 from the south-eastern and the north-western sections of the site is considered unlikely to unacceptably impact on the wallum sedgefrog.

The area of the site containing standing freshwater in the pasture areas to the west of the site is to be retained within the 40 m buffer and natural vegetation area. The proponent has also proposed to reconstruct the pasture areas into a swamp sclerophyll module which would involve vegetation plantings of flora species associated with regional ecosystem 12.3.5. These plantings would be expected to improve habitat in these areas, which may encourage the wallum sedge frog to these areas. The integrity of these areas would also be maintained through the implementation of best practice stormwater and ASS management measures. I state conditions in this report requiring the proponent to adequately manage stormwater runoff and acid sulfate soils to reduce degradation of habitat within the setback area along Oakey Creek.

The project is not expected to have and unacceptable impact on the wallum sedge frog and would not be inconsistent with the 2006 *National Recovery Plan for the Wallum Sedgefrog and Other Wallum-dependent Frog Species*[63], through ensuring that suitable areas of habitat are retained and rehabilitated within the 40 m setback.

Mammals

A search of the EPBC protected matters database identified nine species of mammal that are listed as threatened under the EPBC Act as potentially occurring within five km of the project site. These species are provided in Table 6.4.

[62] Department of the Environment, Water, Heritage and the Arts, 2010, *Survey guidelines for Australia's threatened frogs: Guidelines for detecting frogs listed as threatened under the EPBC Act*, Department of the Environment, Canberra, viewed 20 November 2013, http://www.environment.gov.au/system/files/resources/ff3eb752-482d-417f-8971-f93a84211518/files/survey-guidelines-frogs.pdf

[63] Meyer, E., Hero, J-M., Shoo, L. and Lewis, B. 2006. *National recovery plan for the wallum sedgefrog and other wallum-dependent frog species* . Report to Department of the Environment and Water Resources, Canberra. Queensland Parks and Wildlife Service, Brisbane, viewed 8 December 2013, http://www.environment.gov.au/system/files/resources/9f40ec86-f7c6-476a-9712-7676a2f43da6/files/wallum-frogs.pdf

Table 6.4 Threatened mammal species potentially occurring in the project area

Common name Scientific name	EPBC status	NC Wildlife Regulation status	Likelihood of occurrence
Large-eared pied bat *Chalinolobus dwyeri*	Vulnerable	Vulnerable	Species or species habitat may occur within area
Northern quoll *Dasyurus hallucatus*	Endangered		Species or species habitat may occur within area
Spotted-tailed quoll *Dasyurus maculatus maculates*	Endangered	Vulnerable	Species or species habitat may occur within area
Brush-tailed rock-wallaby *Petrogale penicillata*	Vulnerable	Vulnerable	Species or species habitat may occur within area
Koala *Phascolarctos cinereus*	Vulnerable (south east Queensland bioregion)		Species or species habitat known to occur within area
Long-nosed potoroo *Potorous tridactylus tridactylus*	Vulnerable	Vulnerable	Species or species habitat may occur within area
Grey-headed flying-fox *Pteropus poliocephalus*	Vulnerable	-	Roosting known to occur
Water mouse *Xeromys myoides*	Vulnerable	Vulnerable	Species or species known to occur within area

The koala was added to the EPBC Act threatened species list after the controlled action decision date and therefore cannot be considered in this assessment.

Whilst listed threatened mammals are listed as potentially occurring within five km of the project area, field surveys indicated that there is limited habitat on the site to support these species. Habitat assessments indicated that:

- the absence of rocky outcrops would limit the use of the site by the northern and spotted tail quolls and the brush-tailed rock-wallaby
- the limited number of forested areas containing dense ground strata and high structural diversity would limit the use of the site the long-nosed potoroo
- the limited areas with a deep leaf litter layer and/or debris (fallen logs etc.) would limit the use of the site by the northern and spotted tail quolls
- the paucity of permanent standing freshwater would limit the use of the site by the northern quoll
- the absence of caves and disused buildings would limit the use of the site by microchiropteran bat species such as the large-eared pied bat.

Habitat assessments indicated that the site provides suitable habitat for the water mouse in the areas of mangrove and salt marsh along Oakey Creek.

The survey methodologies and survey effort undertaken by the proponent to identify the presence of threatened mammal species (as described in section 8.1 of the EIS) is considered to be appropriate and in accordance with the 2011 *Survey Guidelines for Australia's Threatened Mammals*[64] *and 2010 Survey Guidelines for Australia's Threatened Bats*[65].

Only one threatened species of mammal, the grey-headed flying fox was identified during surveys. The grey-headed flying fox is listed as vulnerable under the EPBC Act.

Grey-headed flying-fox

The grey-headed flying-fox was recorded feeding on blossoms of a blue gum eucalypt (*Eucalyptus tereticornis*) in the western section of the site.

The grey-headed flying fox is a canopy-feeding frugivore and nectarivore, typically found in rainforests, open forests, closed and open woodlands, *Melaleuca* swamps and *Banksia* woodland habitats[66]. The primary food source is blossom from *Eucalyptus* and related genera (*Corymbia* and *Angophora*), melaleucas and banksias. Roost sites are typically located near water, such as lakes, rivers or the coast, and typically consist of vegetation rainforest patches, stands of *Melaleuca*, mangroves and riparian vegetation. This species make seasonal migrations in response to flowering and fruiting and is highly irregular in its distribution patterns. Suitable feed tree including flowering eucalypts/acacias were identified in the south-west corner of the site. No roosting camps were identified in the project area.

Key threats to this species include loss of foraging habitat (e.g. flowering and fruiting tree species) through vegetation clearing and development.

There is currently no approved conservation advice available for this species or relevant threat abatement plans. While a recovery plan has not been progressed beyond draft form, the New South Wales government has listed a number of priority actions aimed at ensuring the recovery of this species. The 2009 *Draft National Recovery Plan for Grey-headed Flying-fox*[67] is summarised in Appendix 5.

The proposed development is considered unlikely to have an unacceptable impact on the grey-headed flying. The proposed development would minimise impact on the grey-headed flying fox by retaining suitable flowering and fruiting tree species in the 40 m buffer zone and natural vegetation area in the western section of the site. Conditions stated in this report require the proponent to rehabilitate and revegetate the area to the west of Shipper Drive and the 40 m buffer zone.Tree plantings associated with

[64] Department of Sustainability, Environment, Water, Population and Communities, 2011, *Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the EPBC Act*, Department of the Environment, Canberra, viewed 20 November 2013, ://www.environment.gov.au/system/files/resources/b1c6b237-12d9-4071-a26e-ee816caa2b39/files/survey-guidelines-mammals.pdf

[65] Department of the Environment, Water, Heritage and the Arts, 2010, *Survey guidelines for Australia's threatened bats: Guidelines for detecting bats listed as threatened under the EPBC Act*, Department of the Environment, Canberra, viewed 20 November 2013, http://www.environment.gov.au/resource/survey-guidelines-australias-threatened-bats-guidelines-detecting-bats-listed-threatened.pdf

[66] Department of the Environment 2013. *Pteropus poliocephalus* in Species Profile and Threats Database, Department of the Environment, Canberra, viewed 8 December 2013, http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=186

[67] Department of Environment, Climate Change and Water NSW. 2009. Draft National Recovery Plan for the Grey headed Flying-fox Pteropus poliocephalus. Prepared by Dr Peggy Eby. Department of Environment, Climate Change and Water NSW, Sydney. Viewed 10 December 2013, http://www.environment.nsw.gov.au/resources/threatenedspecies/08214dnrpflyingfox.pdf

revegetation works in the buffer areas would also include a number of flowering species that would provide suitable foraging habitat for this species.

The project is not expected to have and unacceptable impact on the grey-headed flying fox and would not be inconsistent with the recovery plan *Draft National Recovery Plan for Grey-Headed Fying Fox*, provided that measures are undertaken to retain and improve potential foraging habitat.

Water mouse

The water mouse is listed as 'vulnerable' under the EPBC Act. This species is found in coastal habitats generally within salt marsh, mangroves and adjacent freshwater wetland habitats. Mangrove habitats are particularly important for the water mouse as they provide a variety of micro-habitats such as tidal pools, crab holes and crevices in bark and around roots. Key threats to this species in Queensland include the clearing and fragmentation of habitat and habitat degradation due to altered hydrology. Other threats include disturbance of acid sulfate soils, use of pesticides, recreational vehicle use and introduced animals.

There is no approved conservation advice available for this species. There is currently a *National recovery plan for the Water Mouse (False Water Rat) Xermys myoides 2010*[68] which lists key actions required for the recovery of the water mouse include confirming and documenting the current distribution of the species; mapping known populations and their habitat; assessing the impact of known threatening processes; developing and implementing a threat management plan to rehabilitate habitat at priority sites; engaging the community in efforts to protect existing populations by establishing voluntary agreements with relevant land owners and managers; and coordinating the recovery process.

The EIS indicated that the water mouse may be impacted during the removal of estuarine wetland vegetation (e.g. mangroves and salt marsh) for the site during construction. The EIS stated that the vegetation management plan for construction would include measures to reduce injury to animals during vegetation clearing works.

I state conditions in this report requiring the proponent to ensure that any EPBC listed species identified during are construction works are appropriately relocated to prevent injury.

Potential impacts to this species associated with the project would be reduced by retaining suitable habitat within the proposed 40 m setback from Oakey Creek and enhancing habitat values along Oakey Creek through the removal of weeds and implementation of a revegetation works.

The proponent has made a commitment to implement best stormwater management measures to minimise degradation of the proposed buffer zone. The EIS reported that a retaining wall would be constructed around the northern and western perimeter of the site. The retaining wall would be intended to reduce impacts by preventing earthwork

[68] Department of the Environment and Resource Management 2010. *National recovery plan for the water mouse (false water rat) Xeromys myoides*. Report to Department of Sustainability, Environment, Water, Population and Communities, Canberra. Department of the Environment and Resource Management, Brisbane, viewed 8 December 2013, http://www.environment.gov.au/system/files/resources/ebc3b4f3-1cf5-4ec2-ae98-7778453075a2/files/xeromys-myoides-recovery-plan.pdf

activities from encroaching on the proposed conservation buffer zone between the development and Oakey Creek.

The water mouse is discussed in the following threat abatement plans:

- *Threat abatement plan for predation by feral cats 2*008[69]
- *Threat abatement plan for predation by the European Red Fox 2008*[70]

Predation pressures from foxes and feral and domestic cats are likely to pose significant threats to populations of the water mouse; particularly those located close to urban environments in parts of coastal Queensland. Feral cats and the European red fox are scheduled as class 2 pests under the Queensland *Land Protection (Pest and Stock Route Management) Act 2002*. Under this Act land owners are required to ensure that land is kept free of class two pests. The pest management measures proposed by the proponent and required by conditions would not be inconsistent *with the threat abatement plans for the predation of feral cats and the European red fox.*

I consider that the proposed mitigation measures, and the conditions stated in this report, are not inconsistent with the National Recovery Plan for the water mouse and the relevant threat abatement plans.

Threatened marine fauna

Fish

A search of the EPBC protected matters database identified one species of fish listed as vulnerable under the EPBC Act, as potentially occurring within five km of the site. This species the black rockcod (*Epinephelus daemelii*) was added to the EPBC Act threatened species list after the controlled action decision date and therefore cannot be considered in this assessment.

Sharks

A search of EPBC protected matters database for project site (five km radius) identified two species of shark that the listed as threatened under the EPBC Act. These species are provided in Table 6.5.

[69] Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). *Threat abatement plan for predation by feral cats*, Department of the Environment, Water, Heritage and the Arts, Canberra, viewed 11 December 2013, http://www.environment.gov.au/system/files/resources/91832626-98e3-420a-b145-3a3199912379/files/tap-cat-report.pdf

[70] Department of the Environment, Water, Heritage and the Arts, 2008. Threat abatement plan for predation by the European red fox, Department of the Environment, Water, Heritage and the Arts , Canberra, viewed 11 December 2013, http://www.environment.gov.au/system/files/resources/1846b741-4f68-4bda-a663-94418438d4e6/files/tap-fox-report.pdf

Table 6.5 Threatened shark species with the likelihood to occur in the project area

Common name Scientific name	EPBC Act status	NC Wildlife Regulation status	Likelihood of occurrence
Grey nurse shark *Carcharias Taurus*	Critically endangered	Endangered	Species or species habitat may occur within
Green sawfish *Pristis zijsron*	Vulnerable	-	Species or species habitat may occur within

Grey nurse shark

The grey nurse shark has been identified as a conservation value in the *East Temperate Bioregional Plan*[71]. The proposed development site does not provide suitable habitat for the grey nurse shark. This species is found primarily in inshore waters around rocky reefs and islands, in or near deep sandy-bottomed gutters or rocky caves, and occasionally in the surf zone and shallow bays. Sites that are identified as critical habitat for this species in the Moreton Bay region are found near Moreton and North Stradbroke Islands. Given the proximity of these areas, to the development site (approximately 86 km) the proposed action is not expected to unacceptably impact on this species.

Green sawfish

The Green Sawfish inhabits muddy bottom habitats of inshore marine waters, estuaries, river mouths and along sandy and muddy beaches. Sawfishes generally feed on shoaling fish such as mullet and molluscs and small crustaceans. Whilst potentially suitable habitat may occur in the Coomera River, this species is considered unlikely to be present as it has not been sighted in Moreton Bay since 1960's[72]. The proposed development is not expected to have an unacceptable impact on this species, provided that adequate measures are undertaken to maintain sufficient water quality in the Coomera River.

Marine mammals

An EPBC Act protected matters search identified one species of mammal listed as threatened under the EPBC Act as potentially occurring in the project area. This species the southern right whale (*Eubalaena australis*) is listed as Endangered under the EPBC Act. Southern right whales use habitat seasonally and are found along the Australian coast for several months of the year. The southern right whale is typically an oceanic species feeding mainly of krill. Given its typical habitat range this species is highly unlikely to occur in the Coomera River. The proposed development is therefore not expected to have an unacceptable impact on this species.

[71] Department of Sustainability, Environment, Water, Population and Communities 2012, *East Temperate Bioregional Plan*, Commonwealth Australia 2012, Canberra, viewed 11 December 2013, http://www.environment.gov.au/system/files/pages/1e59b6ec-8b7e-42a8-9619-b5d728f878b2/files/temperate-east-marine-plan.pdf

72 Johnson, J.W. 1999, *Annotated checklist of the fishes of Moreton Bay*, Queensland, Australia. Memoirs of the Queensland Museum 43, 709- 762.

Marine turtles

An EPBC Act protected matters search identified six species of marine turtle listed as threatened under the EPBC Act as potentially occurring within five km of the project site. These species are identified in Table 6.6.

Table 6.6 Threatened marine turtle species potentially occurring in the project area

Common name Scientific name	EPBC Act status	NC Wildlife Regulation status	Likelihood of occurrence
Green turtle *Chelonia mydas*	Migratory Vulnerable		Foraging, feeding or related behaviour known to occur within area
Loggerhead turtle *Caretta caretta*	Migratory Endangered	Endangered	Species or species habitat likely to occur within area
Leatherback turtle Dermochelys coriacea	Migratory Endangered	Endangered	Species or species habitat likely to occur within area
Hawksbill turtle Eretmochelys imbricate	Migratory Vulnerable		Species or species habitat likely to occur within area
Olive ridley turtle Lepidochelys olivacea	Migratory Endangered	Endangered	Species or species habitat likely to occur within area
Flatback turtle Natator depressus	Migratory Vulnerable		Species or species habitat likely to occur within area

No surveys were undertaken to determine the presence of marine turtle species within the project area.

All six of the marine turtle species known to occur in Australian waters have been recorded in Moreton Bay. Logger head and green turtles are known to inhabit Moreton Bay year round in relatively high abundances. In contrast hawksbill, leather back, olive ridley and flat-back turtles are only known to occur occasionally, in much lower abundances. Moreton Bay is identified as a significant feeding ground for the loggerhead turtles, which occur in the thousands to feed on molluscs, crustaceans and sponges, supporting the most significant concentration of young and mature loggerhead turtle in Australia. Moreton Bay is also identified as a significant feeding ground for green turtles. Large numbers of green and loggerhead turtles are typically found along the western coast of Moreton and North Stradbroke Island; particularly Moreton Banks, Amity Banks and Peel Island[73].

All marine turtles are known to inhabit shallow inshore waters with the exception of the leatherback turtle, which is mostly pelagic only coming into inshore waters during its nesting season. Turtle species most likely to occur in the project area include the green turtle which may forage on seagrass within the Coomera River.

[73] Queensland Parks and Wildlife Service, 2001, *Moreton Bay Marine Park: Introductory Guide*, Queensland Government.

Surveys undertaken for the EIS in 2008 and 2010 to determine the presence of seagrass in the project area identified sparse patches of seagrass (with less than five per cent cover) on the western shore of Foxwell Island, the eastern side of Thompson Island, within the canals of Hope Island Sanctuary Cove and the Isle of Wings. Denser and larger patches of seagrass were also identified at the mouth of the Coomera River, and along the eastern foreshore of Coomera Island, approximately nine km downstream for the proposed GCIMP site. The seagrass communities found in these areas were typically comprised of three seagrass species, primarily *Halophila ovalis* and some *Halophila uninervis* and *Halodule spinulosa* which are the preferred seagrass species of the green turtle[74]. As such these seagrass beds may provide suitable foraging habitat for the green turtle.

Key threats to marine turtles include deteriorating water quality and the loss of habitat associated with coastal development; by-catch in fisheries; entanglement in marine debris and shark control nets, ingestion of marine debris and litter and boat strike.

Marine turtles are listed as a species' of interest in the following abatement plans:

- *Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs 2005* (flatback, hawksbill and loggerhead turtle)
- *Threat abatement plan for predation by the European Red Fox 2008 (flatback, green and loggerhead turtle)*
- *Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Marine Life 2009*[75].

The threat abatement plans for the European red fox and the feral pigs relate to marine turtles generally with regard to nesting. Feral pigs and foxes have been identified as predators on marine turtle eggs in parts of mainland Australia. Given that turtle nesting is unlikely to occur on the site, these threat abatement plans would not be relevant to the site.

Marine turtles have been identified as a conservation value in the *Temperate East Marine Bioregional Plan*.

Impacts

The EIS indicated a number of potential impacts on marine turtles.

The suspended sediment plumes generated by proposed capital and maintenance dredging works are expected to result in a localised loss of 1.23 ha of seagrass from the seagrass beds at Foxwell Island and 800 m downstream from the project site. These seagrass beds are considered to provide potential foraging habitat to green turtles, based on the species of seagrass present in these areas. Previous sightings of turtles in the area suggest utilisation of foraging habitat within the Coomera River, although potentially at low levels. Given the importance of seagrass to Green Turtles and the historical and predicted declines in seagrass within Moreton Bay, it is

[74] Preen, A.R. 1995, *Diet of Dugongs:are they omnivores*, Journal of Mammalogy. 76:163-171
[75] Department of the Environment, Water, Heritage and the Arts, 2009, *Threat abatement plan for the impacts of marine debris on vertebrate marine life*, Department of the Environment, Canberra, viewed 8 December 2013, http://www.environment.gov.au/system/files/resources/d945695b-a3b9-4010-91b4-914efcdbae2f/files/marine-debris-background-paper.pdf

considered that the loss of 1.23 ha of seagrass is a significant impact to the Green Turtle.

Project construction and operational activities may affect water quality exposing turtles to toxicants such as hydrocarbons, oils, heavy metals and other harmful substances or by impacting on foraging habitat (phytoplankton blooms and increased sediment loads). Gross pollutants such as litter and debris which may be mobilised in stormwater runoff may also impact on turtles through entanglement and/or ingestion of these pollutants. Up to 30 per cent of turtle mortalities in Moreton Bay are attributed to the ingestion of plastic litter[76].

The construction of the marinas would lead to an increase in the number of vessels using the Coomera River by an average of 69 boat trips per day. This increase in traffic may result in more frequent interactions between boating traffic and marine turtles.

Adverse effects of noise on turtles can range from behavioural modification, including mild disturbance, disruption or impairment of activities, and displacement from key habitats, to injury, disorientation, capillary damage, loss of motor control and even to death in severe cases[77].

Pile driving, dredging operations and shipping activities associated with the proposed development may impact on turtles by exposing them to levels of underwater noise which may adversely affect their behavioural patterns and in the case of pile driving, cause injury or death.

Turtles may be trapped during the implementation of silt curtains. Severity of impacts would be dependent on the length of time they are trapped and the activities undertaken within the enclosed area.

I state conditions in this report requiring:

- further surveys be undertaken to determine the extent of seagrass prior to commencing dredging operations
- an offset for any residual significant impacts on seagrass attributable to the proposed development
- all vessel maintenance and cleaning activities are undertaken away from areas where contaminants can be released into any receiving waters
- provision common user facilities within the marina for the handling and disposal of ship-sourced pollutants, including oil, garbage and sewage
- procedures are implemented during the construction of the marina to avoid the entrapment of turtles
- measures to reduce underwater noise impacts on turtles
- offsets for any significant impacts on turtles associated with boat strike
- provision of signage at the GCIMP, informing readers about EPBC listed species, and advice about how to minimise impacts on MNES from boat strike and litter

[76] Healthy Waterways 2013, *Plastic Pollution Revolution–Our turtles have had a gutful*, viewed 11 November 2013, http://www.healthywaterways.org/HealthyWaterways/Improvingourwaterways/Litterinourwaterways.aspx

[77] Lenhardt, M.L., Moein, S. & Musick, J.A. (1996) *A method for determining hearing thresholds in marine turtles*. Proceedings of the Fifteenth Annual Workshop on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-387.

- all maintenance dredging works are undertaken using a cutter suction dredge
- a fauna spotter to be present during all dredging to monitor for turtles. Dredging activities would be halted where marine turtles are observed within 100 m from the dredge.

I consider that the proposed mitigation measures, and the conditions attached to the proposed approval, are not inconsistent with the *National Recovery Plan for the Marine Turtles* and the *Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Marine Life*. Approval of this project is not considered to be inconsistent with the *Temperate East Marine Bioregional Plan*.

6.4. Migratory species protected under international agreements

6.4.1. Context

Moreton Bay is recognised as supporting the third highest concentration of migratory shorebird species in Queensland[78]. Over 40 000 migratory shorebirds (around 32 species) known to use Moreton Bay[79] between September and April to rest and replenish energy reserves whilst undertaking long distance annual migrations.

Key threats to migratory species in the Moreton Bay region include the loss and degradation of coastal and inland wetland habitat as a result of urban and industrial development. Urban and industrial developments may cause degradation of wetland habitat through changes to existing watersheds, pollution and eutrophication of waterways and increased rates of siltation and sedimentation.

An EPBC Act protected matters search identified a total of 48 species scheduled as migratory under the EPBC Act as potentially occurring in the project area, including 39 birds.

Migratory birds

Most of the site is tidally influenced with over 26 ha of the site being tidally inundated on the highest astronomical tide. The tidal influence has resulted in the formation of semi-permanent estuarine wetland in the centre of the site which provides foraging and roosting habitat for a high diversity of waterfowl/wader species including a number of species listed as migratory under the EBPC Act. Whilst the area provides suitable habitat for a number of bird species, many of the species utilising the site are considered to be transient, and use the site as part of their wider general movements through a broader corridor complex.

The estuarine wetland communities on the site are well represented in the region and significant areas of wetland habitats are protected in a number of conservation reserves within the Moreton Bay region. The wetland habitats in these conservation areas support a large number of migratory bird species.

[78] Thompson, J. J. (1990). *A reassessment of the importance of Moreton Bay to migrant waders*. Sunbird 20(3).
[79] Driscoll, P. V. (1997). *The Distribution of Waders Along the Queensland Coastline*. In: Straw, P. (ed.) (1997). Shorebird Conservation in the Asia Pacific Region based on papers presented at a symposium held on 16-17 March in Brisbane, Australia. Melbourne. AWSG of Birds Australia.

The areas that have been identified as significant for migratory waders within five km from the site include Lake Coombabah and Coombabah Creek, Jewel and McCoys Creek and the western foreshore of the Pimpama River.

The Coombabah-Parklands Conservation Reserve is located approximately four km to the south of the proposed GCIMP site and protects 1292 ha of riverine/estuarine and palustrine wetland habitat which are of importance to a number of migratory water bird species. Thirty-four migratory bird species have been recorded in this area reserve including all species that have been observed on the development site.

The Pimpama Rivers Conservation Cluster is located six km to the north of the proposed GCIMP site and protects approximately 448 ha of coastal wetland habitat in the lower reaches of the Pimpama River. This reserve cluster is part of a series of protected estates which complement the adjacent Southern Moreton Bay Island National Parks, Moreton Bay Marine Park/Ramsar wetland site and Pimpama Fish Habitat Area. This conservation area forms one of the largest mainland conservation reserves in the Gold Coast and southern Moreton Bay area and provides important wetland habitat for large diversity of migratory shorebirds with more than 18 migratory bird species being recorded in this area including all species that have been observed on the development site.

An EPBC Act protected matters search identified a total of 50 migratory marine, wetland, and/or terrestrial bird species as potentially occurring within five km of the site.

Habitat assessment

Twelve species of migratory bird identified as potentially occurring within five km of the site include albatross of petrel species. These species of migratory birds are considered unlikely to use the site, as these birds typically forage at sea.

The estuarine wetland areas of the site including the central semi-permanent wetland provide suitable habitat for majority of the marine and wetland species with the exception of the sanderling which typically prefer open sandy beach habitat and the wood sandpiper (*Tringa glareola)* which typically prefer freshwater wetland habitat. The Latham's snipe (*Gallinago hardwickii)* and Australian painted snipe also typically prefer freshwater wetland habitat, however are known to utilise saline/brackish wetlands. Potential suitable habitat for the freshwater species is restricted to the constructed dam in the western section of the site. Only four of these migratory wetland species were identified during field surveys (Table 6.7). Based on results of extensive surveys, the other wetland migratory species are not considered likely to use the site.

Habitat assessments also indicated that there is limited habitat for terrestrial migratory species. Only two migratory terrestrial bird species were identified during field surveys. These species are provided in Table 6.7 below.

The other migratory terrestrial species are more typically found in moist eucalypt and rainforest ecosystems with the exception of the rufous fantail which is sometimes found in drier sclerophyll forests and the satin flycatcher which is occasionally recorded in thickets of paperbarks and mangroves. Based on results of extensive surveys, these species are not considered likely to use the site.

Table 6.7 Threatened migratory species with the likelihood to occur in the project area

Common name Scientific name	EPBC status	Listing under international agreements
Great egret *Ardea alba*	Migratory marine Migratory wetland	CAMBA
Cattle egret *Ardea ibis*	Migratory marine Migratory wetland	JAMBA, CAMBA
Sharp-tailed sandpiper *Calidris acuminate*	Migratory wetland	JAMBA, CAMBA, ROKAMBA
Red-necked stint *Calidris ruficollis*	Migratory wetland	JAMBA, CAMBA, ROKAMBA
White-bellied sea-eagle *Haliaeetus leucogaster*	Migratory terrestrial	CAMBA
Rainbow bee-eater *Merops ornatus*	Migratory terrestrial	-

Wetland species

Great egret (Ardea alba)

The great egret occurs widely in the locality throughout the year and is known to use a wide range of marine, terrestrial and freshwater habitats. Key threats to the great egret include loss and/or degradation of foraging and breeding habitat through alteration of water flows, drainage and/or clearing of wetlands and invasion of weeds.

This species recorded 15 times during over total survey period and around 1 to 12 individuals were observed on the site.

Cattle egret (Ardea ibis)

The cattle egret also occurs widely in the locality is known to typically use low lying grasslands, woodlands and terrestrial wetland habitats. The Cattle Egret roosts in trees, or amongst ground vegetation in or near lakes and swamps. Key threats to this species include loss and degradation of habitat and predation by feral cats.

This species was recorded 6 times during the total survey period and around 1 to 4 individuals were observed.

Sharp-tailed sandpiper (Calidris acuminate)

The sharp-tailed sandpiper spends most of the non-breeding season in Australia and is widespread along much of the Queensland coast during this period. Six per cent of birds that have been recorded in Queensland are found in the South-east Queensland region typically in the northern sections of the Moreton Bay Marine Park and lower abundances in the Broadwater region. This species typically forages on the edges of wetlands and intertidal mudflats and also forages among inundated saltmarsh vegetation. The sharp tailed sandpiper typically roosts on the edges of wetlands, on wet open mud or sand or in saltmarsh vegetation

Key threats to this species include loss of foraging and roosting habitat and habitat degradation (e.g. degraded water quality).

This species was recorded within the central wetland area twice during surveys and around 8 to 15 individuals observed.

Red-necked stint (Calidris ruficollis)

The red-necked stint spends most of the non-breeding season in Australia with high densities on the Victorian and Tasmanian coasts. The species is mostly found in coastal areas, including sheltered inlets, bays, lagoons and estuaries with intertidal mudflats. The red-necked stint typically utilises shallow intertidal mudflats for foraging and sheltered beaches and sometimes salt marsh for roosting.

Key threats to this species include loss of foraging and roosting habitat, disturbance and habitat degradation (e.g. degraded water quality). Roosting and foraging birds are sensitive to discrete, unpredictable disturbances such as loud noises (e.g. construction sites) and approaching objects (e.g. boats).

Whilst this species is known to occur in the Moreton Bay region, it was not included in the Ramsar listing documentation, suggesting that Moreton Bay is not internationally important for this species. This species was recorded in the central wetland area twice during surveys and around 8 to 15 individuals observed.

Impacts and mitigation

The proposed development would impact on these migratory wetland species through the removal of 17 ha of estuarine wetland habitat (including the central wetland area) within the project footprint. Whilst the site provides foraging and roosting habitat for a number of migratory shorebird species the development site is not considered to be important habitat as the site does not support at least 0.1 per cent of the flyway population for any of the identified species; supports less than 15 species, and supports less than 2000 individuals of each species.

Terrestrial species

Rainbow bee-eater (Merops ornatus)

The rainbow bee-eater mainly occurs in open forests and woodlands, shrub lands, and various cleared or semi-cleared habitats. It may also be found in riparian, floodplain or wetland vegetation assemblages. The species is widely recorded across the Gold Coast region. Field investigations indentified suitable foraging habitat for this species on the site, but no habitat suitable for nesting. As there is no suitable nesting habitat on site, the proposed clearing activities are not expected to impact on any nesting habitat of this species. This species was recorded 12 times during the total survey period and around one to four individuals were observed on the site.

The only identified threat to the rainbow bee-eater is cane toads (*Bufo marinus*) reducing reproductive success by preying on eggs and chicks. As there is no nesting habitat at the site, threats to this species as are considered negligible.

Given the broad area of occurrence of this species and the wide range of suitable foraging habitats, the proposed works are therefore unlikely to have an unacceptable impact on the this species.

The rainbow bee-eater is identified as a species of interest in the *Threat abatement plan for predation by European red fox* 2008. I consider that the proposed mitigation measures, and the conditions relating to the management of pest animals attached to the proposed approval, are not inconsistent with this threat abatement plan.

White-bellied sea eagle (Haliateetus leucogaster)

The white-bellied sea eagle is typically found in coastal terrestrial wetland habitats. This species forages over both open water and terrestrial habitats and typically breeds/nests close to water in areas of tall open forest or woodland. Key threats to this species include the disturbance of nesting pairs by human activity. The white-bellied sea-eagle is sensitive to disturbance when nesting, especially during the early stages of the breeding season, and may desert nests and young if confronted by humans or exposed to human activity.

This species was recorded during field surveys and an active nest site was located on the property immediately to north of the site. As no active nests were identified on site, the proposed clearing activities are not expected to impact on any nesting habitat of this species. This species was recorded 13 times during the total survey period and only one individual was observed each time. Only one active nest was identified to the north of the site. Disturbance to this species would be reduced by providing a 40 m setback between the development and Oakey Creek. Noise impacts associated with the proposed development would be reduced by implementing noise control measures such as incorporating design elements that minimise noise levels and the selection of plant and equipment that generates a lower level of noise. These noise controls which would form part of the development approval would assist in reducing potential disturbances to this species.

The removal of the central wetland area from the site may remove some foraging habitat for this species. However given the low number of individual birds observed throughout the survey period, the site is not considered to provide significant habitat for this species. The proposed works are therefore unlikely to have an unacceptable impact on the local and regional population of this species.

The white-bellied sea eagle is identified as a species of interest in the *Threat abatement plan for predation by European red fox* 2008. I consider that the proposed mitigation measures, and the conditions relating to the management of pest animals attached to the proposed approval, are not inconsistent with this threat abatement plan.

Migratory marine mega-fauna

No surveys were undertaken to determine the presence of marine mega-fauna species within the project area.

Marine turtles

All six species of turtle that were discussed in the threatened marine fauna section of this report on page 127 are also listed as migratory under EPBC Act. Potential impacts

on marine turtles and mitigation measures to reduce potential impacts are also discussed in the threatened marine fauna section of this report.

Migratory marine mammals

An EPBC Act protected matters search identified three species of marine mammal listed as migratory under the EPBC Act as potentially occurring within five km of the site. These species are provided in Table 6.8. The EIS indicated that dugong which are listed as migratory under the EPBC Act, may also occur within the project area.

Table 6.8 Migratory marine mammals with likelihood to occur in the project area

Common name Scientific name	EPBC Act status	NC Wildlife Regulation status	Likelihood of occurrence
Southern right whale *Eubalaena australis*	Migratory Endangered	-	Species or species habitat likely to occur within area
Irrawaddy dolphin Orcaella brevirostris	Migratory		Species or species habitat likely to occur within area
Indo-Pacific humpback dolphin *Sousa chinensis*	Migratory	Near threatened	Species or species habitat likely to occur within area

Southern right whale

As previously discussed in the threatened fauna section of the chapter, the southern right whale is highly unlikely to occur in the Coomera River.

Irrawaddy dolphin

The Irrawaddy dolphin is only known to occur in the northern half of Australia from the Brisbane River on the east coast to Broome on the west coast. The Irrawaddy dolphin occurs mainly in protected shallow coastal and estuarine waters, close to river and creek mouths. The Irrawaddy dolphin has been recorded in Moreton Bay, however sightings are rare[80]. Due to their coastal, estuarine distribution this species is particularly vulnerable to human activities in and adjacent to the coastal zone. Key threats to this species include entanglement in fishing gear and shark nets, habitat degradation and pollution and boat strike. Whilst this species is identified as potentially occurring in the Coomera River, it not expected to be present for long periods due to their transient nature.

Indo-Pacific humpback dolphin

Indo-Pacific humpback dolphins typically occur in shallow coastal, estuarine, and occasionally riverine habitats, generally in depths of less than 20 m. This species is known to feed on a wide variety of coastal and estuarine-associated fishes. The western section of Moreton Bay and the lower reaches of the Brisbane River have been identified as key habitats for this species. Occupying similar habitat to the Irrawaddy dolphin, the Indo-Pacific humpback dolphin is also particularly vulnerable to

[80] Hale,P, Long.S, Tapsall, A 1998, '*Distribution and conservation of Delphinids in Moreton Bay and Catchment*', School of Marine Science, The University of Queensland.

human activities in and adjacent to the coastal zone. Whilst this species is identified as potentially occurring in the Coomera River, it not expected to be present for long periods due to their transient nature.

The Indo-Pacific humpback dolphin has been identified as a conservation value in the *Temperate East Marine Bioregional Plan*.

Dugongs

Herds of dugongs are found in wide, shallow, protected bays and mangrove channels, where they forage in large seagrass meadows. Whilst dugongs are mostly found in coastal waters they have also been identified using estuarine creeks and have been known to travel several kilometres upstream[81].

Dugongs have a naturally low population growth rate due to their slow maturation, low birth rates and investment in their young, making dugong populations highly susceptible to both natural and anthropogenic influences.

Moreton Bay is a significant foraging and breeding ground for the dugong and is ranked among the top ten dugong habitats in Queensland. Between 80 and 98 per cent of Moreton Bay's dugongs are found around the Moreton and Amity Banks seagrass beds off North Stradbroke Island[82].

Dugong populations in Moreton Bay have been affected by major flooding events which have impacted on the availability of seagrass. For example during the 2010/2011 major flooding events, the seagrass cover in Moreton Bay declined by almost 50 per cent[83]. Following this event the annual stranding report for 2011 compiled by EHP indicated that dugong mortalities that year were highest on record[84]. The majority of mortalities were attributed to disease and ill health which is likely to correlate with the loss of seagrass during the 2010/2011 major flooding events.

A previously discussed, surveys undertaken for the EIS in 2008 and 2010 identified a number of patches of seagrass within the Coomera River. As dugong have preference for similar seagrass species to green turtle, these patches of seagrass would also considered suitable foraging habitat for dugong.

Impacts on migratory mega-fauna

Similar to the marine turtles, the dugong may also be impacted by the loss of seagrass associated with the proposed capital and maintenance dredging works.

Dugong and dolphins are also sensitive to a range of pollutants, such as hydrocarbons, oils, heavy metals and gross pollutants. The risk of exposing to pollutants to dugong and dolphins is considered to be low, provided that adequate measures are undertaken to reduce impacts on water quality.

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[81] Lawler, I., H. Marsh, B. McDonald & T. Stokes 2002, *Current State of Knowledge: Dugongs in the Great Barrier Reef*. CRC Reef Research Centre, Townsville.

[82] Lanyon & Morrice 1997 *The Distribution and Abundance of Dugongs in Moreton Bay*, South-east Queensland, Report to Queensland Department of Environment, May 1997.

[83] CSIRO 2012, *Moreton Bay seagrasses make full recovery after the flood*, CSIRO 19 September 2012, viewed 27 September 2013, http://www.csiro.au/Portals/Media/Moreton-Bay-seagrasses-make-full-recovery-after-the-flood.aspx

[84] Meager, J.J. & Limpus, C.J. (2012) Marine wildlife stranding and mortality database annual report 2011. I Dugong. *Conservation Technical and Data Report* 2011 (1):1-30, viewed 27 September 2013, http://www.ehp.qld.gov.au/wildlife/pdf/dugong-report-2011.pdf

Dugongs and dolphins are sensitive to underwater noise and have the potential to be impacted by underwater noise generated by pile driving, dredging operations and shipping activities associated with the proposed development. Marine turtles, while less sensitive to noise than dugongs and dolphins also have the potential to be impacted by underwater noise.

Similar to marine turtles, dolphins and dugong may also be trapped during the implementation of silt curtains.

Dugong and dolphins are susceptible to boat strike. The increased vessel traffic associated with the project would increase the risk of collisions. Marine turtles, dolphins and dugong may also be impacted during dredging operations through interactions with dredge equipment.

The dugong is listed as a species of interest in the *Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Marine Life*. The EIS indicated that impacts from sewage discharge, wastewater and garbage would be minimised through the provision of common user facilities at the marina.

I state conditions in this report requiring:

- that all vessel maintenance and cleaning activities are undertaken away from areas where contaminants can be released into any receiving waters
- provision common user facilities within the marina for the handling and disposal of ship-sourced pollutants, including oil, garbage and sewage
- that procedures are implemented during the construction of the marina to avoid the entrapment of EPBC listed fauna
- an offset for any residual significant impacts on seagrass attributable to the proposed development
- offsets for any significant impacts on marine fauna associated with boat strike
- provision of signage at the GCIMP, informing readers about EPBC listed species, and advice about how to minimise impacts on MNES from boat strike and litter
- that all maintenance dredging works are undertaken using a cutter suction dredge
- to have a fauna spotter present during all dredging to monitor for turtles. Dredging activities would be halted where marine mega-fauna are observed within 100 m from the dredge.
- measures to reduce underwater noise impacts on marine megafauna

I consider that the proposed mitigation measures, and the conditions attached to the proposed approval, are not inconsistent with the *Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Marine Life.*

I consider that the proposed development is unlikely to have an unacceptable impact on marine mega-fauna, provided the proponent avoids, mitigates and offsets potential impacts, as recommended to be included as conditions of approval. Approval of this project is not considered to be inconsistent with the Temperate East Marine Bioregional Plan.

Migratory fish

An EPBC Act protected matters search identified one species of migratory fish. This species are identified in Table 6.9.

Table 6.9 Threatened migratory fish species with the likelihood to occur in the project area

Common name Scientific name	EPBC Act status	NC Wildlife Regulation status	Likelihood of occurrence
Porbeagle shark *Lamna nasus*	Migratory		Species or species may occur within area

The porbeagle shark is common in pelagic and coastal waters, mainly feeding upon pelagic fishes, squid and shellfish. This species is not considered likely to use the Coomera River or Broadwater area and is therefore unlikely to be impacted by the proposed development

I consider that the proposed development is unlikely to have an unacceptable impact on migratory fish. Approval of this project is not considered to be inconsistent with the Temperate East Marine Bioregional Plan or Australia's obligations under the Bonn Convention.

6.5. Wetlands of international importance

6.5.1. Overview

Wetlands that are designated under the Ramsar Convention are those recognised as being internationally important that are considered to be representative, rare or unique; or important for conserving biological diversity. Ramsar wetlands are recognised as a matter of national environmental significance under the EPBC Act.

The proposed development is located approximately three km upstream from Coomera Island which forms part of the south western boundary of the Moreton Bay Ramsar site (see Figure 6.2).

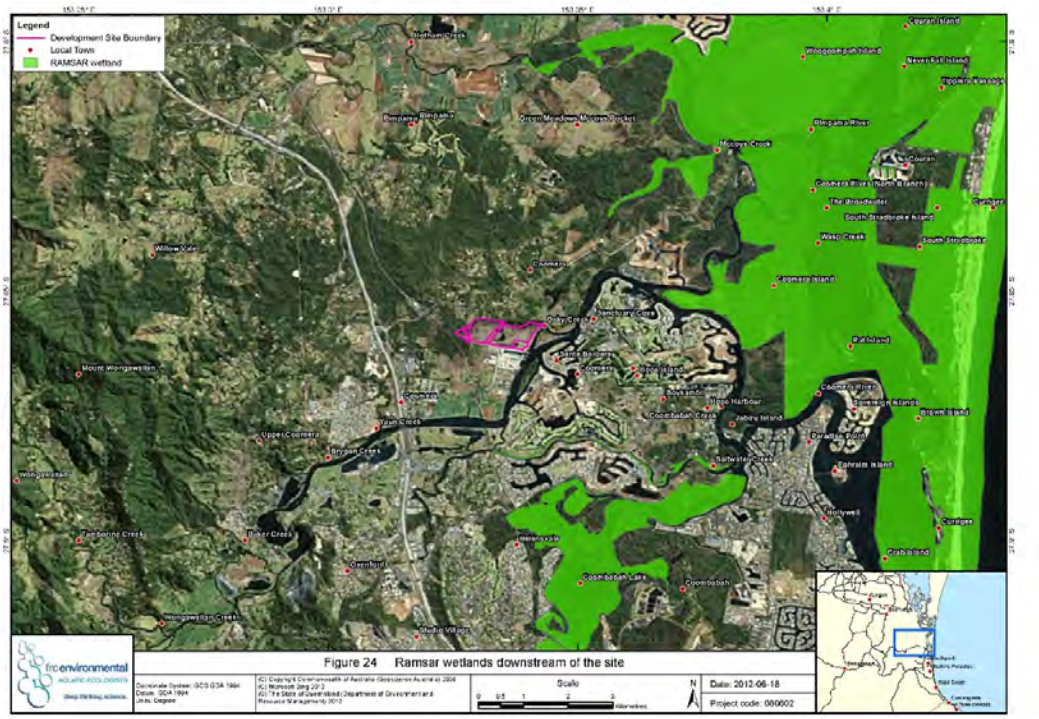

Figure 6.2 Ramsar wetlands near the project site

The Moreton Bay Ramsar site was designated as a wetland of international importance under the Ramsar Convention on 22 October 1993, based on six of the nine criteria used for identifying wetlands of international importance. Justification for Moreton Bay's listing under each of the relevant criteria is provided in Table 6.10.

Table 6.10 Justification for Moreton Bay's listing under the criterion used for identifying wetlands of international importance

Criterion no.	Criterion	Justification
1	A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region	The Moreton Bay Ramsar site is located in the North-East Coast Australian Drainage Division. It is one of the largest estuarine bays in Australia which are enclosed by a barrier island of vegetated sand dunes. Moreton Bay protects the local area from oceanic swells, providing habitat for wetland development. The site receives and channels the flow numerous rivers and creeks east of the Great Dividing Range.
2	A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities	Moreton Bay supports large numbers of the nationally threatened green turtle, hawksbill turtle, loggerhead turtle. Other nationally threatened species that the site supports are the oxleyan pygmy perch, honey blue-eye, water mouse and the Australian painted snipe. The site is ranked among the top ten habitats in Queensland for the Internationally vulnerable dugong.
3	A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region	The Moreton Bay Ramsar site supports over 355 species of marine invertebrates, at least 43 species of shorebirds, 55 species of algae associated with mangroves, seven species of mangrove and seven species of seagrass. At least 43 species of shorebirds use intertidal habitats in the bay, including 30 migratory species listed by international migratory bird conservation agreements.
4	A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions	Moreton Bay is a significant feeding ground for the threatened green turtle and is a foraging and breeding ground for the dugong. The bay also has the most significant concentration of the young and mature loggerhead turtle in Australia.
5	A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds	The Moreton Bay Ramsar site supports more than 50 000 wintering and staging shorebirds during the non-breeding season.
6	A wetland should be considered internationally important if it regularly supports one per cent of the individuals in a population of one species or subspecies of waterbird	The Moreton Bay Ramsar site regularly supports more than 1 per cent of the population the wintering eastern curlews (3000 to 5000) and the grey-tailed tattler (10 000).

6.5.2. Impacts on ecological character

Context

Approval is required for an action occurring within or outside a declared Ramsar wetland if the action has, will have, or is likely to have a significant impact on the ecological character of the Ramsar wetland.

The Ramsar convention defines the ecological character of a wetland as the combination of the ecosystem components, processes, benefits and services that characterise a wetland at a given point in time[85].

Critical components, processes and services/benefits of the Moreton Bay Ramsar site include:

- diversity, representativeness and connectivity
- near-natural wetland habitat reference sites
- marine and aquatic fauna
- wetland dependent terrestrial fauna
- wetland communities and species
- shorebird populations
- fisheries, indigenous cultural significance, research and education, tourism and recreational use.

The 2008 *Moreton Bay Draft Ecological Character Description* report identified the following existing impacts as potentially impacting on the ecological character of the Moreton Bay Ramsar site:

- disturbance and reduction of habitat quality for migratory shorebirds
- decreasing water quality in the southern and western bay areas
- seagrass loss in Deception Bay and the southern bay (and its potential impact on fisheries, dugong and turtle populations) and increasing incidence and intensity of lyngbya phytoplankton blooms.

The EIS investigated the construction and operational activities that have the potential to impact on the ecological components and processes of the Moreton Bay Ramsar site, in terms of water quality and coastal processes and interactions for marina flora and fauna.

Impacts on water quality

Capital and maintenance dredging

The EIS indicated that the closest seagrass beds within the boundary of the Ramsar site are located approximately nine km from the GCIMP site in the Broadwater area. Modelling undertaken for the EIS indicated that turbid plumes generated by the capital dredging represent a low risk to seagrass meadows within the boundaries of the Ramsar site. Based on the tolerance limits for seagrass as defined by Delft Hydraulics

[85] Ramsar Convention 2005, Resolution IX.1 Annex A. *A conceptual framework for the wise use of wetlands and the maintenance of their ecological character*, viewed 20 August 2013, http://www.ramsar.org/pdf/res/key_res_ix_01_annexa_e.pdf

Institute[86], the EIS indicated that capital dredging is expected to have the greatest impact on the seagrass beds at Foxwell Island and 800 metres downstream where turbidity and TSS concentrations would be highest. The EIS indicated that there may be a residual loss of 1.23 ha of seagrass.

Modelling undertaken to determine impacts associated with maintenance dredging works and the discharge of tail-water indicated that the seagrass beds at Foxwell Island, would again be affected during maintenance dredging. Other seagrass in the Coomera River are not expected to adversely impacted by suspended sediment plumes generated by maintenance dredging works or tail-water discharges.

The EIS indicated that no seagrass beds within the Ramsar site would be negatively affected by sedimentation of the suspended sediments generated during the capital and maintenance dredging works. The rate of sedimentation beyond the immediate dredge footprint is expected to be below the sedimentation tolerance limits for seagrass defined by the Delft Hydraulics Institute[87].

I state conditions in this report to manage any water quality impacts including:

- implementation of a Receiving Environment Monitoring Plan commencing at least 18 months prior to commencement of works to determine appropriate water release criteria
- management of construction and dredging works to minimise release of acid sulfate material and suspended sediments to marine waters
- management of operations, including stormwater and ship-sourced pollutants, to minimise to marine waters
- facilities used for storing environmentally hazardous substances within the project site are designed and located to ensure that material remain secure at all times and that secondary containment is provided to prevent releases to the environment from spillages of leaks
- ensuring that all vessel maintenance and cleaning activities are undertaken away from areas where contaminants can be released into any receiving water
- provision of common user facilities within the marina for the handling and disposal of ship-sourced pollutants, including oil, garbage and sewage

I consider the proposed action is unlikely to result in unacceptable impacts to the water quality of the Ramsar site, provided the proponent avoids, mitigates and offsets potential impacts, as recommended to be included as conditions of approval.

Impacts on hydrodynamics

Seagrass and mangroves are colonisers of mud, silt and sand and are dependent of availability of substrate. Substrate availability is dependent on tidal and sediment transport regimes which affect the distribution of substrate. The distribution of these

[86] Chevron 2010, *Draft Environmental Impact Statement/Environmental Review and Management Programme for the Proposed Wheatstone Project*: *Technical Appendices N3 to N10*, Chevron Australia Pty Ltd, viewed 25 November 2013, http://www.chevronaustralia.com/Libraries/Chevron_Documents/Wheatstone_Draft_EIS_ERMP_Technical_Appendices_N3_to_N10_web.pdf.sflb.ashx

marine plant communities, are therefore dependent on factors the influence the hydrological regime of the system.

Construction

The EIS reported the proposed dredging works and filling of site are expected to have an effect on flow velocities in the Coomera River around the site. Changes to flow velocities would be expected to have a localised impact on the rates of sediment transport/deposition and bank erosion processes.

Hydrodynamic modelling undertaken to determine the effects of the proposed development on existing hydrodynamic processes indicated that the proposed development would be expected to have a localised effect on the tidal conditions in the section of Oakey Creek adjacent to Foxwell Island and the secondary channel of the Coomera River between Foxwell Island and the proposed development.

Hydrodynamic conditions would be expected to remain relatively unaffected in the main channel of the Coomera River between Foxwell and Hope Islands.

Sediment transport modelling undertaken to determine the impact of these changes to sediment transport regimes indicated that the increases in tidal flow velocities would be expected to cause localised scouring of the creek bed, however are not expected to impact on broader erosion processes in the Coomera River. These localised effects of scouring are not expected to impact on any seagrass beds within the Coomera River.

As these impacts would be highly localised the proposed works are therefore not expected to impact on hydrological processes that influence the distribution of wetland communities within the Ramsar site or seagrass beds in the Coomera River.

Operation

The EIS indicated the increase in the number vessels associated with proposed development using the Coomera River may impact on hydrological processes through the creation of boat wash. Waves generated by boat wash can impact on bank and river bed erosion processes which can influence the recruitment of mangrove and salt marsh species and the distribution of seagrass.

Marine vessel traffic associated the other developments in the Coomera River including the Gold Coast City, Hope Island, Coomera Waters, River Links and Paradise Point marinas have contributed to erosion processes in the Coomera River. Erosion control measures including rock training and retaining walls and no wash zoning have been implemented in the lower reaches of the Coomera River.

The EIS reported that the proposed development is expected to increase the existing number of vessels using the Coomera River by 69 boat trips per day. This would equate to an increase by 4.4 per cent. The EIS indicated that erosion impacts associated with this increase would be difficult to quantify given the existing number of vessels already using the Coomera River and other processes that impact on bank erosion. The EIS indicated that vessel traffic may impact on the recovery of the seagrass beds as Foxwell Island. As previously discussed, conditions stated in the report require the proponent to offset any residual impacts on seagrass.

Impacts within the lower reaches of the Coomera River, which are within the boundary of the Ramsar wetland are expected to be partly mitigated as a result of the currently implemented erosion sediment control measures.

Impacts on wetland dependent species

Shorebirds

Given the proximity of the development to the Ramsar site, the proposed development is unlikely to have any direct impacts on shorebirds. The habitat to be cleared on the site does not constitute important habitat for any of the shorebird species and there is no significant residual impact on migratory birds requiring offsetting. The proposed development is therefore unlikely to have an unacceptable impact on the ecological character of the Moreton Bay Ramsar site with regard to migratory shorebirds.

Dugong and green turtles

Impacts on fauna that important to the ecological character of the Moreton Bay Ramsar wetland including dugong and green turtle are discussed in the threatened and migratory species section (pages 131-139) of this report.

I have considered that the proposed development is unlikely to have an unacceptable impact on the marine fauna that are important to the ecological character of the site, provided that adequate measures are undertaken to reduce and offset any impacts on these marine fauna.

Marine pests

The risk of introducing or spreading marine pests would be considered to be low, provided that debris and runoff from hull cleaning and maintenance activities is prevented from entering receiving waters and that adequate sewage and waste reception facilities are provided for vessels.

The proponent has proposed a range of management measures to ensure invasive marine pest species are not introduced or spread including:

- implementing restrictions to ensure that no hull cleaning or maintenance are undertaken in the marina where debris or runoff can enter receiving waters
- implementation of signage to inform patrons and the public about hull cleaning and maintenance restrictions to designated areas
- prohibiting the pumping of contaminated bilge waste in the marina where waste may enter receiving waters
- ensuring that bilge waste is removed under a waste trade agreement (via sewer) or a licensed waste removalist.

I state conditions in this report requiring the proponent to ensure that all vessel maintenance and cleaning activities are undertaken away from areas where contaminants can be released into any receiving waters. I have also conditioned the proponent to provide common user facilities for the disposal of ship-sourced pollutants including bilge waters.

I have considered that the proposed development is unlikely to have an unacceptable impact on the ecological character of the Ramsar site, provided that adequate measures are undertaken to prevent the introduction and/or spread of existing marine pests.

Terrestrial weeds and pest animals

As the proposed development site is located 3.3 km from the Ramsar site, the proposed action is unlikely to directly impact on the site through the introduction of weeds and pest animals. The introduction and spread of weeds and pest animal species would be managed in accordance with a weed and pest animal management plan. I have conditioned the proponent to ensure that the site is kept free of weed and pest animals. I have considered that the proposed development is unlikely to have an unacceptable impact on the ecological character of the Ramsar site.

6.6. Principles of ecologically sustainable development

My assessment of the project has taken into account the principles of ecologically sustainable development, which as defined in Part 1, section 3A of the EPBC Act, are:

- decision making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations
- if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- inter-generational equity – that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
- the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making, and
- improved valuation, pricing and incentive mechanisms should be promoted.

My report has analysed and taken into consideration the information from the EIS and additional material concerning the long-term and short-term economic, environmental, social and equitable considerations that are relevant to the project.

Any lack of certainty related to the potential impacts of the project is addressed by conditions that restrict environmental impacts, impose strict monitoring and adopt environmental standards which, if not achieved, require the application of response mechanisms in a timely manner to avoid adverse impacts.

The proposed conditions will ensure potential impacts on EPBC Act protected matters including the Moreton Bay Ramsar site, listed threatened species and communities and listed migratory species are reduced and mitigated to the greatest extent possible. These conditions allow for the project to be delivered and operated in a sustainable way to protect the environment for future generations and preserve matters of national environmental significance in perpetuity.

I have considered the importance of the conservation of biological diversity and ecological integrity in relation to all of the controlling provisions for this project, and the assessment provided within my report reflects that consideration.

My evaluation of the project presented in this report also considers a range of information on the economic costs, benefits and impacts of the project. I have sought to ensure that financial costs of compliance with the conditions are reasonable to the extent that the project can proceed whilst also making a fair contribution to environmental protection.

6.7. Bioregional plans

The site of the proposed marina is within state controlled inshore waters, and therefore not within the area covered by the Temperate East marine bioregional plan. However, key species listed in Schedule 2 of the plan (including marine turtles) utilise inshore habitats and as such the marine bioregional plan is relevant to the controlling provisions in accordance with section 176(5) of the EPBC Act.

Pressures on the species identified in Schedule 1 of the marine bioregional plan have been assessed as described in the relevant sections above, and I believe that while the proposed action is likely to contribute to pressures such as vessel strike and habitat modification, the impacts as a result of the proposed action are unlikely to be unacceptable.

I consider that the recommended decision to approve the proposed action with conditions is not inconsistent with the objectives of *The marine bioregional plan for the Temperate East Marine Region.*

6.8. Coordinator-General's overall conclusions

I have reviewed the EIS, and conclude that the proponent has adequately identified impacts of the project on the ecological character of the Moreton Bay Ramsar wetland, TECs, threatened flora and fauna and migratory species listed under the EPBC Act. My conclusion on mitigation and management measures proposed by the proponent, and the conditions stated in this report is that the project is not inconsistent with any of the international conventions relevant to threatened species and communities, migratory species and Ramsar wetlands.

6.8.1. Construction

The proponent has adequately identified the potential impacts that the project poses to MNES during construction.

I require the proponent to manage the following impacts through conditions stated in this report, to ensure that there are no unacceptable impacts to MNES during construction:

- disturbance to threatened and migratory species habitat
- injury and mortality of threatened and migratory species

- degradation of water quality beyond the project site.

With the conditions of approval as stated, I consider the impacts to MNES from construction of the GCIMP to not be unacceptable.

6.8.2. Water mouse

The proponent has adequately identified the potential impacts that the project poses to the water mouse.

I require the proponent to implement measures to reduce impacts to water mouse through conditions stated in this report, including:

- limiting disturbance to and degradation of habitat
- improving quality of existing habitat.

In light of the mitigation measures and conditions I state, I consider that the impacts to the water mouse are neither unacceptable nor inconsistent with the recovery plan for the water mouse and relevant threat abatement plans.

6.8.3. Grey-headed flying-fox

The proponent has adequately identified the potential impacts that the project poses to the grey-headed flying fox.

I require the proponent to implement measures to reduce impacts to grey-headed flying fox through conditions stated in this report, including:

- limiting disturbance to habitat
- improving quality of existing foraging habitat.

In light of the proposed mitigation measures and conditions I state, I consider the impacts to the grey-headed flying fox to be neither unacceptable nor inconsistent with the recovery plan for grey-headed flying-fox.

6.8.4. Marine turtles

The proponent has adequately identified the potential impacts that the project poses to marine turtles.

I require the proponent to manage impacts to marine turtles through conditions stated in this report, including:

- limiting the area of disturbance of marine turtle habitat
- managing the quality of water being released from the project site
- managing noise from piling and dredging
- providing offsets for significant residual impacts.

In light of the proposed mitigation measures and stated conditions, I consider the impacts to marine turtles to be neither unacceptable nor inconsistent with the recovery plan for marine turtles and the relevant abatement plans. However, the residual impacts to foraging habitat (seagrass) are considered to be significant impacts requiring offsetting in accordance with the EPBC Act Environmental Offsets Policy.

6.8.5. Migratory birds

The proponent has adequately identified the potential impacts that the project poses to migratory birds.

Given that the habitat to be cleared does not constitute important habitat for any of the listed migratory bird species likely to occur in the project area, I consider the impacts of habitat loss and degradation to be not unacceptable. Additionally, there is no significant residual impact on migratory birds requiring offsetting. I have given consideration to the relevant threat abatement plan for the white-bellied sea eagle and rainbow bee-eater and have considered that the proposed development would not be inconsistent with these threat abatement plans.

I consider that the impacts to migratory birds are not unacceptable and that approving the project would not be inconsistent with Australia's obligations under the Bonn Convention, CAMBA, JAMBA and ROKAMBA.

6.8.6. Migratory marine fauna

The proponent has adequately identified the potential impacts that the project poses to migratory marine fauna.

I require the proponent to implement measures to reduce impacts to migratory marine fauna through conditions stated in this report, including:

- limiting the area of disturbance of migratory marine fauna habitat
- managing water quality being released from the project site
- managing noise from piling and dredging
- providing offsets for significant residual impacts.

In light of the mitigation measures and stated conditions, I consider that the impacts to migratory marine fauna are not unacceptable and that approving the project would not be inconsistent with Australia's obligations under the Bonn Convention. However, the residual impacts to foraging habitat (seagrass) are considered to be significant impacts requiring offsetting in accordance with the EPBC Act Environmental Offsets Policy.

6.8.7. Moreton Bay wetland of international importance

The proponent has adequately identified the potential impacts that the project poses to the ecological character of the Moreton Bay wetland.

I require the proponent to implement measures to reduce impacts to the ecological character of the Moreton Bay Ramsar site through conditions stated in this report, including:

- managing the quality of water being released from the project site
- providing offsets for significant residual impacts.

In light of the mitigation measures, I consider that the impacts to the ecological character of the Moreton Bay Ramsar site are not unacceptable and that approving the project would not be inconsistent with:

- Australia's obligations under the Ramsar Convention

- Australian Ramsar management principles
- Moreton Island National Park, Cape Moreton Conservation Park and Moreton Island Recreation Area Management Plan
- Water Quality Improvement Plan for Moreton Bay.

6.8.8. Conditions for approval for matters of national environmental significance

The DOTE has recommended the following conditions of approval in addition to the State's conditions listed in Appendices 1-4.

Marina

The proponent must install signage within the Gold Coast International Marine Precinct, informing readers about EPBC listed threatened and migratory species, and providing advice about how to minimise impacts on MNES from boating activities and litter. Each sign must be installed in a high traffic area of the Gold Coast International Marine Precinct and not less than 1.5 square metres in area.

Environmental offsets

The proponent must prepare an offset plan to address significant residual impacts to matters of national environmental significance. Impacts that must be offset include increased risk of:

- the loss of seagrass and potential seagrass habitat
- potential boat strike and mortality of EPBC listed marine species.

The proposed offset plan must be approved by the Minister prior to the commencement of construction.

The offset plan must include, but not necessarily be limited to:

- a detailed description of the values affected and the extent and likely timing of the impact on each
- detailed descriptions of how enhanced conservation outcomes for the affected environmental values, including MNES will be achieved in accordance with the Queensland Government Environmental Offsets Policy, Fish Habitat Policy and the *EPBC Act Environmental Offsets Policy 2012*
- detailed costings of the measures that will be implemented to achieve these outcomes
- timeframes and key milestones for implementation of offsets
- discussion of the risks and uncertainties associated with the proposed offsets
- mechanisms for monitoring and reporting of offset milestones and outcomes
- mechanisms to ensure that offsets are maintained for the duration of the impacts
- provisions and measures to ensure that actions taken to conserve, manage and protect MNES have no detrimental impact on the habitat and populations of other listed threatened species and ecological communities or migratory species that are identified as occurring at the offset site.

- corrective actions and contingency measures to be implemented (including the timing of implementation of these) where monitoring of the offset area/s under the offset plan shows that key milestones are not being or are unlikely to be met.
- the offset delivery mechanism(s) comprising one or more of: land-based offsets, direct benefit management plans, offset transfers and/or offset payments
- a legally binding mechanism that ensures protection and management of offset areas
- include textual descriptions and maps clearly defining the locations and boundaries of offset areas which are accompanied by a GIS Shapefile.

The offset plan must be implemented within two years of commencement of construction, or as directed by the Minister.

7. Conclusion

The proponent is seeking to extend the existing marine precinct on the Coomera River at the Gold Coast, on land which has been designated as marine industry since the 1990s. The project consists of a marine industry zone, with ship-lift facilities for boat and yacht manufacturers; a dry boat stacked storage facility for 290 boats; an internal marina with approximately 110 berths and an external marina with approximately 264 berths.

In undertaking my evaluation of the EIS, I have considered the EIS and the additional information prepared for this project including agency and public submissions on the EIS and additional information.

I am satisfied that the requirements of the SDPWO Act have been met and that sufficient information has been provided to enable the necessary evaluation of potential impacts, and development of mitigation strategies and conditions of approval.

The environmental assessment commenced with the declaration of this project in July 2011 and has involved a comprehensive body of work by the proponent. More work will occur in the detailed design phase of the project.

The potential impacts identified in the EIS documentation and submissions have been fully assessed. I consider that the mitigation measures proposed by the proponent and required by the conditions stated in this report would result in acceptable overall outcomes and management of impacts.

Based on the information provided by the proponent and outlined in Section 2.3, I conclude that the project will form a logical extension of the existing marine precinct on the Coomera River at the Gold Coast and will deliver employment benefits during both construction and operations by improving the potential of the marine industry on the Gold Coast, including manufacturing and exporting. Accordingly, I recommend the Gold Coast International Marine Precinct project be approved, subject to the conditions in appendices 1 to 4. In addition, I expect that the proponent's commitments will be fully implemented as presented in the EIS documentation.

To proceed further, the proponent will be required to:

- obtain the relevant development approvals under the *Sustainable Planning Act 2009*
- finalise and implement the construction and operations environmental management plans
- finalise the environmental offsets package.

If there are any perceived inconsistencies between the project (as described in the EIS documentation) and the conditions in this report, the conditions shall prevail. The proponent must implement all the conditions of this report.

Section 6 of this report (page 109) describes the extent to which the material supplied by Harbour Island Pty Ltd addresses the significant impacts on MNES of each controlled action for the project. The proponent is required to develop an offsets package to address these impacts.

Copies of this report will be issued to:

- DOTE
- GCCC
- DEHP
- TMR
- DNRM
- the Minister for the Environment (Cwlth).

A copy of this report will also be available on the Department of State Development, Infrastructure and Planning's website at **www.dsdip.qld.gov.au/coordinator-general**

This report will generally lapse four years from the date it is published on the department's website, or when an approval application is decided for the project, unless a later time is subsequently decided by the Coordinator-General.

Appendix 1. Stated conditions

This appendix includes the Coordinator-General's stated conditions, stated under section 39 of the SDPWO Act.[88]

Schedule 1. Stated conditions

Condition 1. Offset plan

The Coordinator-General has jurisdiction for this condition.

(a) The proponent must prepare a site-based offset plan to address significant residual impacts to State environmental values that are not covered by Commonwealth requirements for MNES.

(b) The offset plan must be lodged with the Coordinator-General no later than 60 days after a Commonwealth decision on offsets to address matters of national environmental significance.

(c) The offset plan must be approved by the Coordinator-General prior to commencement of construction

(d) The approved offset plan must be implemented within one year of commencement of construction.

Condition 2. Receiving Environment Monitoring Program

The Department of Environment and Heritage has jurisdiction for this condition.

(a) A Receiving Environment Monitoring Program (REMP) must be developed and implemented to monitor, identify, and describe the background conditions together with any adverse impacts to surface water quality, water flows and aquatic fauna and flora of any receiving waters.

(b) The REMP must include periodic monitoring for the effects of any release on the receiving environment as a result of contaminant releases to waters from the site.

(c) The REMP must:

  (i) spatially assess the condition of receiving waters within the Coomera River (the REMP area), considering background water quality characteristics based on accurate and reliable monitoring data that takes into consideration temporal variation (e.g. seasonality)

  (ii) establish parameters to be monitored including but not limited to turbidity and TSS, nutrients, metals and metalloids and justify:

    (A) the quality indicators chosen, and

    (B) assumptions and choices made in preparation of the REMP.

(d) be designed to facilitate assessment against water quality objectives for the relevant environmental values that need to be protected

(e) detail monitoring locations and water quality indicators pertinent to the sensitive receptor types and locations that has been designed to:

[88] For a definition of 'stated conditions', refer to the Glossary on page 189 of this report.

(i) determine the baseline condition of water quality and the condition of the seagrass meadows within the zone of influence of the sediment plume to a sufficient resolution to reliably describe changes potentially attributable to sediment plume-related impacts

(ii) develop or adopt locally-relevant trigger values for key water quality indicators

(iii) provide on-line real-time monitoring capability for key sediment plume-related indicators (including but not limited to turbidity and pH)

(f) specify the frequency and timing of sampling required in order to:

(i) reliably assess ambient conditions

(ii) provide sufficient data to derive site specific background reference values in accordance with the *Environmental Protection (Water) Policy 2009 (Coomera River Environmental Values and Water Quality Objectives) (DEHP 2010)*

(g) apply procedures or guidelines from ANZECC and ARMCANZ 2000 and other relevant guideline documents

(h) describe in detail the sampling techniques and all quality assurance and control procedures to be adopted for each type of sampling or laboratory-based analyses as advocated in the *Monitoring and Sampling Manual* (DEHP, 2013).

(i) The REMP must be implemented for a minimum of 18 months prior to commencement of construction activity for the purpose of collecting baseline data, and must not cease until water quality-related impacts derived from the construction activity are no longer observable.

(j) An annual REMP Report outlining the findings of the REMP, including all monitoring results and interpretations, must be prepared and made publically available on the proponent's website annually, with the first report that includes an assessment of background reference water quality in the REMP area compared against water quality objectives, to be published prior to commencement of construction works.

Condition 3. Marina

The Department of Agriculture, Fisheries and Forestry has jurisdiction for this condition.

(a) Facilities used for storing environmentally hazardous materials within the project site must:

(i) be designed and located to ensure hazardous materials remain secured at all times, and consider the potential effects of storm tide inundation

(ii) include secondary containment to prevent releases to the environment from spillage or leaks.

(b) Appropriate equipment to contain and remove spills must at all times be kept stored in a convenient position near the facility, and be available for immediate use.

(c) Common user facilities for the handling and disposal of ship-sourced pollutants, including oil, garbage and sewage, must be provided at a suitable location within the marina.

(d) The ship-sourced pollutants reception facility must be:

(i) designed and operated in accordance with Best practice guidelines for waste reception facilities at ports, marinas and boat harbours in Australia and New Zealand, *Australian and New Zealand Environment and Conservation Council* 1997

(ii) connected to the water service provider's sewerage or other waste reception infrastructure

(iii) available to all vessels visiting the marina.

(e) As part of the construction of the marina:

(i) Procedures must be

(A) implemented to avoid the entrapment of EPBC listed marine species

(B) consistent with DAFF Fish Salvage Guidelines – (http://www.daff.qld.gov.au/documents/Fisheries_Habitats/fish-salvage-guidelines.pdf)

(ii) the initial opening of the marina basin to tidal waters following excavation of the marina basin must be designed and implemented to not exceed discharge criteria approved under Condition 5.

Condition 4. Construction

The Department of Environment and Heritage Protection has jurisdiction for this condition.

(a) The proponent must ensure that NCA and EPBC listed species are relocated from the Gold Coast International Marine Precinct site. The relocation process must include but not be limited to:

(i) completion of a preconstruction survey for listed species immediately prior to construction in any area of the site

(ii) engaging a suitably qualified expert to complete the relocation process.

(b) Prior to commencement of any construction work, the proponent must ensure that efficient procedures for ensuring compliance with applicable environmental legislation, commitments made by the proponent in the EIS and the additional information to the EIS, and approval conditions are prepared and implemented and made available to all employees, contractors and subcontractors.

Condition 5. Marine water quality

The Department of Environment and Heritage Protection has jurisdiction for this condition.

(a) After at least eighteen months of implementation of the REMP, as required under condition 2(i), the proponent must set discharge criteria for relevant parameters, against which future discharges from the Gold Coast International Marine Precinct to the Coomera River must be monitored. The discharge criteria must be:

(i) developed with reference to Queensland Water Quality Guidelines *Environmental Protection (Water) Policy 2009 (Coomera River Environmental Values and Water Quality Objectives) (DEHP 2010)*

(ii) approved by the administering authority prior to commencement of construction.

(b) The proponent must not discharge, irrigate or otherwise release potable water, wastewater, stormwater, harvested water, bilge water or sewage effluent into the Coomera River unless the discharge complies with discharge criteria defined for the site.

(c) Acid sulfate soils or potential acid sulfate soils encountered during construction must be managed in accordance with the latest version of the Queensland Acid Sulfate Soil Technical Manual.

(d) Structural components of the marinas in contact with tidal waters are to be non-biodegradable and are not to be treated with toxic compounds (including but not limited to copper chrome arsenic) or anti-fouling agents such as Tributyltin (TBT).

(e) An Erosion and Sediment Control Plan (ESCP) must be developed by an appropriately qualified person and implemented for all stages of the construction to minimise possible erosion and the release of sediment to receiving waters and contamination of stormwater. The ESCP must be developed in accordance with Best Practice Erosion & Sediment Control (IECA 2008)[89].

(f) The proponent must ensure that maintenance and cleaning of any vessels, vehicles, plant or equipment within the development is not carried out in areas from which contaminants can be released into any receiving waters.

Condition 6. Seagrass

The Department of Agriculture, Fisheries and Forestry has jurisdiction for the following conditions.

The proponent must undertake seagrass surveys within 800m of the Gold Coast International Marine Precinct site to identify the total area and density of seagrass in this area in November and not more than 18 months prior to commencement of construction. The proponent must report to the administering authority results of the seagrass survey and include a statement of the measured extent of seagrass within the project area (in hectares).

Condition 7. Transport infrastructure.

The Department of Transport and Main Roads has jurisdiction for these conditions.

(a) The proponent must implement all necessary measures to mitigate significant adverse impacts on the safety, condition and efficiency of state-controlled and local roads for all stages of the project.

(b) An impact mitigation program must be finalised at least three (3) months prior to the commencement of project construction and may be one or more of the following:

(i) Construction of any required works (including site accesses) as and when stated in a road impact assessment (RIA)[90]

(ii) Payment of any contributions towards the cost of works, rehabilitation or maintenance as and when stated in a RIA

[89] IECA. 2008. Best practice erosion and sediment control. International Erosion Control Association, Australasia.
[90] Refer to DTMR Guidelines for Assessment of Road impacts of Development (2006).

(iii) Undertake or implement any other action as and when stated in a road-use management plan (RMP)[91]

(iv) Actions or payments as otherwise agreed in writing with DTMR and/or the relevant LGA[92] for example, in an infrastructure agreement

(c) In the event the parties are unable to reach agreement on the impact management program, the Coordinator-General will decide the necessary contributions.

Schedule 2. Gold Coast City Council conditions

General conditions

The Gold Coast City Council has jurisdiction for the following conditions.

Condition 1. Development generally

(a) The Gold Coast International Marine Precinct must be wholly located on the Gold Coast International Marine Precinct development code map titled 'GCIMP Map 1 – Boundary', dated September 2012, of the supplementary environmental impact statement for the Gold Coast International Marine Precinct project.

(b) The development must include a 40 m setback from Oakey Creek, defined as Precinct Four – natural conservation/open space precinct, as defined the Gold Coast International Marine Precinct development code map titled 'GCIMP Map 2 – Precincts', dated September 2012.

(c) The proponent must rehabilitate, revegetate and maintain Precinct Four – natural conservation/open space precinct, as defined in the Gold Coast International Marine Precinct development code map titled 'GCIMP Map 2 – Precincts', dated September 2012 and generally in accordance with the Open Space Management Statement, Appendix 40 of the EIS, dated August 2012.

(d) All development will be provided with refuse collection facilities appropriate to service the development.

Condition 2. Registered Professional Engineer Queensland certification

(a) All infrastructure plans submitted to GCCC in future applications must be developed and certified as appropriate by a RPEQ.

(b) Once constructed, certification from a RPEQ must be provided stating that all works have been constructed in accordance with the approved plans.

Advice: this condition applies but is not limited to the following:

- retaining structures/batters long-term factor of safety
- stability of bed, banks and adjoining structures
- primary consolidation settlement completed
- stormwater treatment.

[91] Refer to DTMR Guide to Preparing a Road-use Management Plan

[92] For example, mitigation measures related to operational traffic (routes, hours of operation and the like) would not need to be implemented during the construction phase.

Condition 3. Services

All physical infrastructure required for essential services to the development will be provided and maintained at no cost to state or local government. The proponent must enter into an infrastructure agreement with the Gold Coast City Council before the start of construction, for essential services including water supply and sewerage systems.

Condition 4. Assets to be transferred to GCCC

Any land or infrastructure assets proposed to be transferred to GCCC must be clearly identified in all future approvals.

Condition 5. Development code

Development must be generally in accordance with the 'Gold Coast International Marine Precinct Development Code' (including tables of development, GCIMP place code and associated plans) prepared by Planit Consulting Pty Ltd, dated October 2013.

Advice: it is noted that the Gold Coast International Marine Precinct Development Code may be subject to further revision/amendment through the development application for Preliminary Approval pursuant to section 242 of the *Sustainable Planning Act 2009.*

Hydraulics

Condition 6. Floodplain management report to be amended

The 'Floodplain Management – Gold Coast International Marine Precinct Environmental Impact Statement' prepared by BMT WBM Pty Ltd dated August 2012, and addendum report 'Gold Coast International Marine Precinct, – Environmental Impact Statement, Floodplain Management, Addendum Report' dated September 2013, prepared by BMT WBM Pty Ltd be amended to confirm the following:

(a) The flood impacts in both regional and local flood modelling for all ARI events must ensure no adverse impact external to the site other than the acceptable model noise being 2 mm.

Alternatively

for any impacts greater than normal model noise on the private properties, the report must identify and list all properties, and obtained written consent from the affected property owners.

OR

provide certification endorsed by a qualified legal professional confirming no actionable damage identifying all affected properties based on floor level survey

OR

provide certification endorsed by a qualified legal professional that the probability of actionable damage to private properties for flood events up to and including the one per cent annual exceedence probability would be no greater than 0.3 per cent in any year.

(b) The amended report must provide detailed calculations of the flood storage balance on the site including supporting maps and cross sections. Flood storage calculations are to be in relation to the designated flood level.

(c) The amended report must adequately address the *Gold Coast City GCCC's Planning Scheme Constraint Code for Flood Affected Areas*.

(d) The amended flood report must be submitted to GCCC for approval in conjunction with any future development application on the site or if no application is required, prior to commencement of works on site.

Condition 7. Alteration of overland flow paths

To the extent practicable, alterations to overland flow paths on the site must avoid or minimise alterations to the flow characteristics on other properties for flood events up to and including the one percent annual exceedence probability.

Condition 8. Flood safety of waterway crossing

The applicant must provide to GCCC certification from a suitably qualified hydraulic engineer demonstrating that the proposed road surface above the waterway crossing or the proposed access to the dwelling/development satisfy the flood safety criteria of depth < 0.25 m, d x V < 0.4 m^2/s during a range of flood events up to and including the 1 per cent AEP flood event.

Stormwater and water quality

Condition 9. Stormwater

(a) Stormwater from the development site must be managed to avoid any contamination of receiving waters. Stormwater systems must be designed to:

  (i) comply with the Urban Stormwater Quality Planning Guidelines 2010 (Department of Environment and Heritage Protection), the State Planning Policy (December 2013)

  (ii) not exceed background discharge criteria established under Condition 5

  (iii) Stormwater treatment systems must be constructed and maintained so that all runoff is filtered prior to discharge into waterways.

(b) The stormwater designs and runoff assessment must be submitted to the Department of Environment and Heritage Protection and approved by the Gold Coast City Council as part of any application for a development permit for operational works, as applicable.

Condition 10. Stormwater management plan

(a) The applicant is to submit an updated stormwater management plan with any future application that meets the requirements of the Queensland Urban Drainage Manual Volume 1 Second Edition 2007 ('QUDM').

(b) All stormwater basins/devices proposed for the development must be in accordance with the QUDM and GCCC's *Land Development Guidelines*.

Condition 11. Stormwater Quality Improvement Devices

The applicant shall ensure a Stormwater Quality Improvement Device (SQID) maintenance management plan is developed in accordance with GCCC's Water Sensitive Urban Design Guidelines (2007), and with reference to the water by design document 'Maintaining Vegetated Stormwater Assets' Version 1 February 2012 and prepared by a RPEQ.

Condition 12. Stormwater headwalls, outlets and associated flow paths and channels

All stormwater headwalls/outlets and associated flow paths and channels must be constructed in accordance with *Planning Scheme Policy 11 – Land Development Guidelines, Standard Specifications and Drawings* to avoid erosion and batter deterioration.

Coastal protection and waterway stability

Condition 13. No adverse effect on stability of bed, banks and adjoining structures

(a) The works must not adversely affect the stability and condition of the bed and banks of any tidal water or of any adjoining structure.

(b) If, as a result of the works, any bed, bank or adjoining structure is adversely affected, the applicant must restore the bed, bank or adjoining structure to at least its former stability and condition.

(c) In conjunction with future development applications the applicant must submit to GCCC engineering details of all coastal protection works including the revetment walls in association with a certification from an RPEQ (or equivalent) confirming the stability of the bank of the waterways and marina, and the integrity of the coastal protection structures.

(d) Any proposed structures and/or waterway bank protection measures must be responsive to the hydraulic and geo-morphological characteristics of the waterways as determined by the administering authority.

Condition 14. No adverse effect on natural features and qualities of surrounding waters

Any works along and adjacent to the waterways must not have any adverse affect on the natural features and qualities of the surrounding waters. Measures to achieve this this outcome include:

(a) Water quality must be of a standard that provides for the ecological sustainability of aquatic ecosystems in accordance with the *Australian Water Quality Guidelines for Marine and Freshwater*, ANZECC, 1992

(b) Disturbance to the bed and banks must be kept to a minimum

(c) Measures must be taken to limit turbidity in the waters

(d) Measures must be taken to minimise pollution of the waterway as a result of silt runoff, and the discharge of other contaminants, such as fuel, oil and hydraulic fluid

(e) The site must be assessed for the occurrence of acid sulfate soils where any excavation is proposed in or adjacent to the waterway and action must be undertaken to manage acid sulfate soils where avoidance is not reasonably practicable and

(f) Any environmental harm (whether direct or indirect, cumulative or immediate) arising out of the works must be rehabilitated at the applicant's cost, to the satisfaction of and in accordance with any directions of the Chief Executive Officer.

Erosion and sediment control

Condition 15. Erosion and sediment control

(a) Sediment, erosion and dust control measures must be implemented in accordance with the approved plan/drawings and the *Best Practice Erosion and Sediment Control* (IECA Australasia, November 2008).

(b) Prior to discharging of any water from the site during construction, including dewatering discharge, the applicant must achieve the water quality objectives in Table 8.2.1 of the *Queensland Water Quality Guidelines* (DERM, September 2009).

(c) Water quality must be monitored in accordance with Section 7.5 of the Best Practice Erosion and Sediment Control (IECA Australasia, November 2008) and compared with water quality objectives. A monitoring report must be prepared and retained at the site office and made available to GCCC's inspectors upon request.

Advice: The applicant must notify GCCC's Contributed Asset Section and Department of Environment and Heritage Protection of any non-compliance to water quality objectives and the corrective actions taken by the applicant within 48 hours of the non-compliance.

Condition 16. Inspections and reporting

(a) All erosion and sediment control measures must be inspected on a weekly basis and following runoff events until the site is fully rehabilitated.

(b) A monthly summery of Erosion and Sediment Control (ESC) performances must be compiled and retained at the site office and made available to Council's inspectors upon request

Geotechnical

Condition 17. Geotechnical report to be complied with

All earthworks must be carried out generally in accordance with the advice and recommendations of the geotechnical report: 'Environmental Impact Study, Gold Coast International Marine Precinct, Geotechnical Report', prepared by Shaw Urquhart Pty Ltd, Ref: 06299/1-I, dated July 2012.

Acid sulfate soils

Condition 18. Amended Acid Sulfate Soil Management Plan

An amended acid sulfate soils management plan which complies with the latest version of the Queensland Acid Sulfate Soil Technical Manual must be provided with future applications to GCCC.

Dredge material

Condition 19. Dredge material disposal

Any dredge material disposal and rehandling facility to be constructed on the western portion of the project site must:

- not be inundated by flood events up to the 1 per cent AEP event
- have sufficient capacity to accept anticipated maintenance dredging volumes, including a contingency for flood related channel siltation
- ensure that all water discharged from the facility meets discharge criteria as developed and approved under Appendix 1, Schedule 1, Condition 5
- minimise impacts on visual amenity
- minimise the release of noxious offensive odours or emissions of dust and/or particulate matter
- provide an unobstructed easement or land corridor to facilitate a dredge spoil pipeline from the Coomera River frontage of Shipper Drive to the rehandling facility
- ensure the Shipper Drive road head frontage to the Coomera River is to remain in public ownership
- establish appropriate drainage arrangements/easements from the facility
- ensure public safety.

Traffic and roads

Condition 20. Traffic impact assessment

(a) A revised traffic impact assessment shall be submitted to GCCC as part of any future application on the site to demonstrate the degree of saturation on the southbound approach to the roundabout of Foxwell Road and Shipper Drive does not exceed 0.85v/c.

(b) When traffic does exceed 0.85 v/c the application must provide appropriate mitigation measures.

Condition 21. External roadworks

(a) Prior to the commencement of any new use within Precinct 2 – Northern Precinct, a roundabout is to be designed and constructed at the intersection of Shipper Drive, Waterways Drive and the site, to the satisfaction of the GCCC.

(b) Prior to the commencement of any new use within Precinct 1 – Western Precinct, a roundabout is to be designed and constructed at the intersection of Shipper Drive, Ford Road and the site, to the satisfaction of the GCCC.

Waste management

Condition 22. Waste management plan

An updated Waste Management Plan, complying with GCCC's *Solid Waste Management Guideline for New Developments* (2011) must be submitted to GCCC with all subsequent applications for development approval.

Water and wastewater

Condition 23. Standards for water and wastewater

All water and wastewater reticulation, connections (internal and external to the development), meter boxes, pump stations, schematic plans and network analyses and any other matter relating to water and wastewater, must be in accordance with GCCC's *Planning Scheme Policy 11 – Land Development Guidelines, Standard Specifications and Drawings*.

Condition 24. Public utility wastewater easements

Public utility wastewater easements must be provided for the access, maintenance and construction of services, over GCCC's wastewater infrastructure located in private land. Easements are to comply with GCCC's *Planning Scheme Policy 11 – Land Development Guidelines, Standard Specifications and Drawings.*

Appendix 2. Conditions to be attached to a preliminary approval for operational works under the *Sustainable Planning Act 2009*

Schedule 1. Operational Works—Dredging

Conditions for a Preliminary Development Approval under the *Sustainable Planning Act 2009* for operational works that are tidal works (dredging) for the marina and access channel.

(a) Development approval under the *Sustainable Planning Act 2009* for operational works that are tidal works or prescribed tidal works associated with dredging for the access channel, shall be a preliminary approval.

(b) The boundary and depth of areas to be dredged for the marina and access channel will be generally in accordance with 'GCIMP Map 1 – Boundary, dated September 2012' of the supplementary environmental impact statement for the Gold Coast International Marine Precinct project.

(c) Detailed design plans certified by a Registered Professional Engineer of Queensland must be provided in support of an application for a development permit for operational works (tidal works) and must include:

  (i) the boundaries of the land to be dredged

  (ii) any sand banks

  (iii) the foreshore

  (iv) the line of high-water mark.

(d) The water quality objectives relevant to potentially affected marine ecosystems shall be defined based on at least 18 months of water quality data (including but not limited to turbidity and TSS, nutrients, metals and metalloids), having regard to the *Environmental Protection (Water) Policy 2009 (Coomera River Environmental Values and Water Quality Objectives) (DEHP 2010)* or most current version of these guidelines and must be submitted to the administering authority in support of an application for a development approval.

(e) Excavation of the internal marina basin must only be undertaken in a fully contained, dewatered environment.

(f) Maintenance dredging must only be carried out using a cutter-suction dredge.

(g) Acid sulfate soils or potential acid sulfate soils encountered during construction must be managed in accordance with the Queensland Government's Instructions for the Treatment and management of acid sulfate soils, 2001 (or a later version if it becomes available).

(h) Dredging operations will be fully enclosed by fixed sediment curtains and/or revetment walls at all times in order to prevent the release of sediment to waters

outside the boundary of the activities. Additional sediment curtains must be implemented where these measures are ineffective.

(i) All material dredged for the marina and access channel will be retained within the project site or disposed to a land-based licensed receiving facility.

(j) A dredge management plan must :

  (i) be provided in support of an application for development permit for operational works (tidal works involving dredging) and

  (ii) be submitted to and approved by the administering authority prior to commencement

(k) The dredge management plan must include, but not be limited to:

  (i) detailed plans showing the extent and depth of dredging

  (ii) a hydrographic survey of that land below tidal and subtidal waters on lines not more than 20 metres apart

  (iii) the location(s) of placement of capital and maintenance dredge material, estimated volumes, and details of material containment and dewatering system(s) design, including engineering certification of containment system design

  (iv) management strategies and defined actions to ensure that impacts on marine fauna are minimised

  (v) alternative disposal options for capital and maintenance dredge material that may contain contaminants as defined in the *National Assessment Guidelines for Dredging* (NAGD) (DEWHA 2009)

  (vi) mapping showing the estimated extent of water quality change, including but not limited to total suspended sediment (TSS) and turbidity, as a result of dredging and dredge material disposal activities

  (vii) the potential impact of changed water quality on marine ecosystems, and especially seagrass and coral communities, defined in terms of level of impact (high, medium, and low with associated definition) based on the intensity, duration and frequency of adverse water quality conditions

  (viii) management strategies and defined actions to ensure that impacts on water quality and dependent marine ecosystems are minimised to the greatest extent possible

  (ix) dredge material drain water discharge locations, volumes, water quality monitoring parameters and discharge limits (including but not limited to pH, turbidity, TSS and metals/metalloids) and

  (x) monitoring locations, water quality parameters and triggers/limits to be applied to inform the management of dredging and limit impacts to marine ecosystems outside the project boundary.

(l) All dredged areas are to be maintained in proper operational condition until their decommissioning.

(m) Hydrographic surveys of the navigable areas within the entrance channel and marina basin must be conducted at a frequency of at least once every five years and made publicly available.

(n) Material to be removed as part of maintenance dredging will be assessed for contaminants in accordance with the National Assessment Guidelines for Dredging (NAGD) (DEWHA 2009) or as approved by the assessing authority within the 12 months preceding the planned commencement of maintenance dredging.

(o) The proponent must :

(i) provide the results of the maintenance dredge material contaminant assessment to the assessing authority;

(ii) publish the results on the proponent's web site at least one month prior to commencement and three years following maintenance dredging, and

(iii) include appropriate management measures to be implemented if contaminant levels exceed threshold levels identified in the guidelines.

(iv) The proponent must dispose of all material from maintenance dredging to a land-based licensed receiving facility.

Schedule 2. Operational Works—Tidal works associated with the marina other than dredging for the marina and access channel

Conditions for Preliminary Development Approval under the *Sustainable Planning Act 2009* for operational works that are tidal works or prescribed tidal works associated with the marina, other than dredging for the marina and access channel.

(a) The location and design of the marina will be generally in accordance with 'GCIMP Map 1 – Boundary, dated September 2012', of the supplementary environmental impact statement for the Gold Coast International Marine Precinct project.

(b) The following information will be provided in support of an application for a development permit for operational works (tidal works or prescribed tidal works other than dredging) associated with the marina:

(i) layout and cross sectional drawings (with engineering certification) of the marina, including levels relative to Australian Height Datum for reclamation/filling, and the entrance to the marina;

(ii) details of materials to be used in the revetment walls and reclamation; and

(iii) details of construction methodology and any temporary construction works.

(c) Construction activities below the limit of highest astronomical tide will be fully enclosed by fixed sediment curtains and/or revetment walls at all times in order to prevent the release of suspended sediments to waters outside the boundary of the construction activities.

(d) An underwater noise management plan must be provided in support of an application for a development permit, and implemented during construction works to minimise and mitigate any impacts to marine fauna through pile driving and construction activities.

(e) All pile driving must utilise a 'soft start' procedure, where piling force is increased from minimum force to piling force over a period of not less than three minutes.

(f) Any pile driving at times when the pile is partly or fully submerged in subtidal or tidal waters will be subject to at least the following measures to minimise the impact of underwater noise on marine fauna:

  (i) underwater noise impacts to marine fauna including cetaceans, dugongs and turtles must be minimised to the greatest extent practicable

  (ii) for each specific piling rig, the observation distance must be at least 500 m from the pile driving works site

  (iii) piling may only commence following an initial 30 minute observation period during which no cetaceans, dugongs and turtles are sighted by an appropriately qualified person within the observation distance (referenced f(ii)).

(g) underwater noise from pile driving must be recorded at a distance not greater than 500 m from the pile driving work site, and continually monitored to ensure that noise is below acceptable limits as specified in an underwater noise management plan. If the noise is recorded above 183 dB (referenced to 1µ Pa2.s), pile driving must cease until a revised observation distance is established and verified by a third party under water noise expert.

(h) All noise monitoring and recording required under these conditions must include, but not be limited to:

  (i) effects due to any extraneous factors such as marine traffic noise;

  (ii) location, date and time of monitoring

  (iii) underwater sound level pressure level during pile driving activities as dB (referenced to 1µ Pa2.s).

Schedule 3. Operational works – bulk earthworks

(a) Development approval under the *Sustainable Planning Act 2009* for operational works that are bulk earthworks shall be a preliminary approval.

(b) Bulk earthworks shall be generally in accordance with the plans K173-AA001578 Bulk Earthworks – Master Plan Sheet 1 of 2 and K173-AA001578 Bulk Earthworks – Master Plan Sheet 1 of 2 of the environmental impact statement for the Gold Coast International Marine Precinct project.

Appendix 3. Conditions to be attached to a preliminary approval for reconfiguration of lot under the *Sustainable Planning Act 2009*

(a) Development approval under the *Sustainable Planning Act 2009* for a reconfiguration of lot shall be a preliminary approval.

(b) The reconfiguration of lot shall be completed in four stages and generally in accordance with the plans prepared by Gassman Development Perspectives titled:

  (i) 'Reconfiguation of a lot – stage one – 4163 P ROL 01', dated 11 November 2010

  (ii) 'Reconfiguation of a lot – stage two – 4163 P ROL 02', dated 11 November 2010

  (iii) 'Reconfiguation of a lot – stage three – 4163 P ROL 03', dated 11 November 2010

  (iv) 'Reconfiguation of a lot – stage four – 4163 P ROL 04', dated 11 November 2010.

Appendix 4. Conditions to be attached to a development approval for the commencement of environmentally relevant activities

Schedule 1. ERA 16 – Extractive and screening activities (dredging)

Conditions for Preliminary Development Approval under the *Sustainable Planning Act 2009* for material change of use involving environmentally relevant activity (ERA) 16 – Extractive and screening activities (dredging).

The recommended assessing authority for these conditions is the Department of Environment and Heritage Protection.

(a) This approval is granted for the environmentally relevant activity of dredging for the purpose of construction, operation and maintenance of lawful structures associated with the Gold Coast International Marine Precinct.

(b) Dredging activities must not be conducted outside of the area defined as 'development site' and 'access channel' in 'GCIMP Map 1 – Boundary, dated September 2012', of the supplementary environmental impact statement for the Gold Coast International Marine Precinct.

(c) Any dredging conducted under this approval must:

  (i) comply with a dredge management plan (DMP) approved by the assessing authority prior to commencement of the activity

  (ii) be consistent with the National Assessment Guidelines for Dredging (NAGD, 2009) and

  (iii) be consistent with the Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (EPA, 1998).

(d) Dredge material from maintenance dredging of the marina and access channel will be disposed of on a land-based licensed receiving facility.

(e) If during dredging the marina access, cetaceans, dugongs and/or turtles are observed, within the 100 m (the observation distance) of the dredging activity, dredging must stop and not recommence until the cetaceans, dugongs and/or turtles are observed to travel beyond the observation distance or a 30 minute period has passed since any cetacean, dugong or turtle was last seen by an appropriately qualified person within the observation distance of the dredging work site.

Glossary of terms

Administering authority/ies:

GIS Shapefile: means an ESRI Shapefile containing '.shp, '.shx' and '.dbf' files capturing attributes of the offset areas.

Environmentally Hazardous materials: means materials, including, but not limited to fuels, oils, chemicals and paints, that when released to the marine environment may negatively impact ecological values such as marine water quality, marine vegetation and marine species.

Commencement of Construction: means commencement of site preparation and clearing of vegetation, seismic and/or bathymetric surveying; earthworks, civil works, associated infrastructure (such as workshop, administration facilities, amenities facilities) and marine works. Construction does not include:

- minor physical disturbance necessary to establish monitoring programs; or
- activities that are critical to project activities that are associated with mobilisation of plant and equipment, materials, machinery and personnel prior to the start of development or construction only if such activities will have no adverse impact on MNES.

Construction is completed: means construction of buildings for the Gold Coast International Marine Precinct is completed

MNES: means the following:

- The Moreton Bay Ramsar wetland
- Water Mouse (*Xeromys myoides*)
- Grey-headed flying fox (*Pteropus poliocephalus*)
- Green turtle (*Chelonia mydas*)
- Dugong (*Dugong dugon*)
- Indo-Pacific humpback dolphin (*Sousa chinensis*)
- Great egret (*Ardea alba*)
- Cattle egret (*Ardea ibis*)
- Sharp-tailed sandpiper (*Calidris acuminate*)
- Red-necked stint (*Calidris ruficollis*)
- White-bellied sea-eagle (*Haliaeetus leucogaster*)
- Rainbow bee-eater (*Merops ornatus*).

Appendix 5. Threat abatement plans and species recovery plans

Schedule 1. Threat abatement plans

Part A. Feral pig threat abatement plan (TAP)

The Pig TAP sets out a national framework to guide the coordinated implementation of the objectives and actions considered necessary to manage the environmental damage caused by feral pigs to species and ecological communities affected by the process. The five main objectives and associated recovery actions in order to achieve this goal are as follows:

(a) To prevent feral pigs from establishing in areas where they currently do not occur or are in low eradicable numbers, and where they are likely to pose a threat to biodiversity, especially where they would impact on nationally listed threatened species and ecological communities by:

  (i) identifying areas currently free from feral pigs or where they are eradicable

  (ii) verifying presence or absence of feral pigs in priority areas and developing and implementing management strategies to remove feral pigs from priority areas

  (iii) providing awareness programs to recreational hunters, bushwalkers and land managers

  (iv) reviewing the adequacy and effectiveness of existing legislation.

(b) To integrate feral pig management plans and their implementation into natural resource planning and investment at the regional, state and territory, and national level through consultation and liaison with key stakeholders by:

  (i) coordination between the department and relevant state and territory agencies to set out key concerns and issues to be included in Natural Resource management plans and to establish protocols and use funding and other relevant mechanisms to improve the consistency and coordination of actions across tenures and jurisdictions.

(c) To increase awareness and understanding of land managers and the general community about the damage that feral pigs cause and management options by:

  (i) assessing the adequacy of available information and dissemination of appropriate material to target groups

  (ii) supporting the completion, dissemination and adoption of the pest management component of the Conservation and Land Management Training Package being developed by the National Training Authority.

(d) To quantify the impacts feral pigs have on biodiversity (especially nationally listed threatened species and ecological communities) and determine the relationship between feral pig density and the level of damage by:

  (i) identifying priority areas under threat by feral pigs

(ii) developing and implementing appropriate studies that aim to determine the impact of feral pigs on listed species and the level of control required to reduce the impact to a significant level.

(e) To improve the effectiveness, efficiency and humaneness of techniques and strategies for managing the environmental damage due to feral pigs by:

(i) assessing the need for the development of more effective and humane techniques and strategies to manage feral pigs

(ii) assessing these techniques and strategies through an analysis of costs and benefits, safety, potential impact on non-target species, legal issues and any other practical considerations, and formulate a regional best practice approach.

Part B. Feral cat threat abatement plan

The goal of the Cat TAP is to minimise the impact of cats on biodiversity in Australia and its territories. The Swift Parrott is listed as a species of concern under this TAP. The five main objectives and associated recovery actions in order to achieve this goal are as follows:

(a) Prevent feral cats occupying new areas in Australia and eradicate feral cats from high- conservation-value 'islands' by:

(i) collating data on offshore islands and developing and implementing management plans to prevent, monitor, contain and eradicate any cat incursions;

(ii) working with communities to prevent incursion; and

(iii) monitoring native prey species in areas eradicated of cats.

(b) Promote the maintenance and recovery of native species and ecological communities that are affected by feral cat predation by:

(i) identifying priority areas for cat control and conducting and monitoring regional cat control in these areas; and

(ii) applying incentives to promote and maintain on private or lease hold land within or adjacent to priority areas.

(c) Improve knowledge and understanding of feral cat impacts and interactions with other species and other ecological processes by:

(i) developing simple and cost effective methods for monitoring populations and impacts of foxes;

(ii) investigating interactions between foxes and native carnivores;

(iii) determining the nature of interactions between foxes and other pest animals;

(iv) determining impacts of cat-borne diseases; and

(v) identifying unintended effects of fox control conducted in isolation.

(d) Improve effectiveness, target specificity, humaneness and integration of control options for feral cats by:

(i) developing an effective toxin-bait for cats

(ii) determining appropriate baiting strategies

(iii) ensuring habitat rehabilitation and management of potential prey

(iv) testing and disseminating information on exclusion fence designs regarding cost-effectiveness and

(v) continuing to promote the adoption and adaptation of model codes of practice and standard operating procedures for the humane management of feral cats.

(e) Increase awareness of all stakeholders of the objectives and actions of the TAP, and of the need to control and manage feral cats by:

(i) promoting understanding of the threat to biodiversity posed by feral cats and support for their control, including the use of humane and best-practice cost-effective controls and

(ii) developing communication campaigns to accompany the release of new broadscale cat control techniques.

Part C. Fox threat abatement plan

The goal of the Fox TAP is to minimise the impact of foxes on biodiversity in Australia and its territories. The five main objectives and associated recovery actions in order to achieve this goal are as follows:

(a) Prevent foxes occupying new areas in Australia and eradicate foxes from high-conservation-value 'islands' by:

(i) collating data on offshore islands and developing and implementing management plans to prevent, monitor, contain and eradicate and fox incursions.

(b) Promote the maintenance and recovery of native species and ecological communities that are affected by fox predation by:

(i) identifying priority areas for fox control and conducting and monitoring regional fox control in these areas

(ii) applying incentives to promote and maintain on private or lease hold land within or adjacent to priority areas.

(c) Improve knowledge and understanding of fox impacts and interactions with other species and other ecological processes by:

(i) developing simple and cost effective methods for monitoring populations and impacts of foxes

(ii) investigating interactions between foxes and native carnivores

(iii) determining the nature of interactions between foxes and other pest animals

(iv) identifying unintended effects of fox control conducted in isolation

(v) estimating the environmental and other costs of impacts from foxes.

(d) Improve the effectiveness, target specificity, integration and humaneness of control options for foxes by:

(i) conducting further work on the development of new, or improvements to existing control techniques

(ii) investigating feasibility of control techniques to target foxes and not dingos in some areas

(iii) developing training programs to assist land owners control foxes

(iv) ensuring habitat rehabilitation and management of potential prey, competitors and predators of foxes are considered in fox control programs

(v) continuing to promote procedures for the humane management of foxes.

(e) Increase awareness of all stakeholders of the objectives and actions of this threat abatement plan, and of the need to control and manage foxes by:

(i) promoting understanding of the threat to biodiversity posed by foxes and support for their control, including the use of humane and best-practice cost-effective controls.

Part D. Marine debris threat abatement plan

The aim of the Marine Debris TAP is to provide a coordinated national approach to the implementation of measures to prevent and mitigate the impacts of harmful marine debris on vertebrate marine life. The four main objectives and associated recovery actions in order to achieve this goal are as follows:

(a) Contribute to the long-term prevention of the incidence of harmful marine debris by:

(i) improving waste management practices on land and at sea through collaboration between, state, territory and Australian Governments, industry, non-government organisations and Indigenous communities

(ii) state and territory governments considering to review legislation to ensure that details of waste reception facilities for ships are included in port environment plans

(iii) state and territory governments investigating how Australia's obligations under MARPOL (International Convention for the Prevention of Pollution from Ships) (i.e. to provide adequate waste reception facilities for ship waste) are encompassed in domestic legislation and policies.

(b) Removing existing harmful marine debris from the marine environment and monitoring the quantities, origins and impacts of marine debris and assessing the effectiveness of management arrangements over time for the strategic reduction in marine debris by:

(i) development of a national approach to information collection and management

(ii) improvement of the understanding of the origins of harmful marine debris.

(c) Mitigate the impacts of harmful marine debris on marine species and ecological communities by:

(i) facilitating implementation of wildlife research

(ii) identifying measures to promote the use of biodegradable and oxodegradable plastic in marine-based industries.

Schedule 2. Species Recovery Plans

Part A. National recovery plan for the water mouse

The overall objective of the National Recovery Plan for the water mouse (false water rat) *Xeromys myoides* is to improve the conservation status of the water mouse and its habitat through habitat protection, reducing threats to species' survival, research and increasing public participation in recovery activities.

The specific objectives and a summary of their recovery actions, identified in the Water Mouse Recovery Plan are as follows:

(a) Identify habitats supporting populations of the water mouse and map the current distribution by:
  (i) conducting surveys to confirm the current distribution
  (ii) consolidating existing databases to produce a national dataset
  (iii) producing high-quality GIS mapping and spatial analysis of habitat supporting extant populations
  (iv) conducting surveys and assessments of potential habitat.

(b) Describe key biological and ecological features of the water mouse and its habitat by:
  (i) determining whether genetic differentiation exists across populations
  (ii) understanding the reproductive biology
  (iii) investigating selected field populations to describe poorly known ecological features.

(c) Monitor population trends and identify and manage threats to species' survival by:
  (i) conducting a monitoring program of selected populations to measure trends and abundance and efficacy of management action
  (ii) assessing the impact of known threats on extant populations
  (iii) investigating the relative impact of potential threats.

(d) Rehabilitate habitat to expand extant populations by:
  (i) regenerating habitat corridors at five specified sites
  (ii) evaluating the potential for artificial nesting structures.

(e) Increase public awareness of, and involvement in, water mouse conservation by:
  (i) collaborating with Indigenous landowners to exchange knowledge
  (ii) investigating opportunities for protecting the habitat of extant populations through establishment of voluntary conservation agreement
  (iii) developing and implementing management plans for populations of water mouse that occur on land under voluntary conservation agreements
  (iv) developing and implementing a community awareness and education program.

Part B. Recovery plan for grey-headed flying-fox—July 2009

The overall objective of the Draft National Recovery Plan for the grey-headed flying-fox *Pteropus poliocephalus* is to:

(a) reduce the impact of threatening processes on grey-headed flying-foxes and arrest decline throughout the species' range

  (i) conserve the functional roles of grey-headed flying-foxes in seed dispersal and pollination

  (ii) improve the standard of information available to guide recovery of the grey-headed flying-fox, in order to increase community knowledge of the species and reduce the impact of negative public attitudes on the species.

(b) The specific objectives and a summary of their recovery actions, identified in the Draft Recovery Plan are as follows:

  (i) to identify and protect foraging habitat critical to the survival of grey-headed flying-foxes throughout their range

  (ii) to protect and increase the extent of key winter and spring foraging habitat of grey-headed flying-foxes

  (iii) to identify roosting habitat critical to the survival of Grey-headed Flying-foxes

  (iv) to protect and enhance roosting habitat critical to the survival of grey-headed flying-foxes

  (v) to substantially reduce deliberate destruction of grey-headed flying-foxes in fruit crops

  (vi) to reduce negative public attitudes toward grey-headed flying-foxes and reduce conflict with humans

  (vii) to increase public awareness and understanding of grey-headed flying-foxes and the recovery program, and to involve the community in recovery actions, where appropriate, to reduce the threat of negative public attitudes and conflict with humans

  (viii) to monitor population trends in grey-headed flying-foxes in order to monitor the species' national distribution and status

  (ix) to assess and reduce the impact on grey-headed flying-foxes of electrocution on powerlines and entanglement in netting and on barbed-wire

  (x) to improve knowledge of the demographics and population structure of grey-headed flying-foxes in order to increase understanding of the ecological requirements of the species

  (xi) to increase the effectiveness and efficiency of recovery initiatives for grey-headed flying-foxes by working cooperatively with conservation and management programs with overlapping objectives to remove or reduce the impact of threatening processes on the species

  (xii) to maintain an effective Grey-headed Flying-fox National Recovery Team to oversee the implementation of the Grey-headed Flying-fox National

Recovery Plan to remove or reduce the impact of threatening processes on the species.

(xiii) to provide long-term economic benefits associated with the protection of ecosystem services, promotion of sustainable forest management, improved crop protection regimes, promotion of sustainable agricultural practices and increased viability of some commercial fruit industries.

Part C. Recovery plan for marine turtles in Australia—July 2003

The overall recovery objective of the Marine Turtle Recovery Plan (for the green, flatback, leatherback, olive ridley, loggerhead and hawksbill turtle species) is to reduce detrimental impacts on Australian populations of marine turtles and hence promote their recovery in the wild. The Marine Turtle Recovery Plan noted the continued decline of the eastern Australian population of the loggerhead turtle and identified the need for its conservation to be implicit in all actions. The specific objectives, and a summary of their recovery actions, identified in the Marine Turtle Recovery Plan are as follows:

(a) To reduce the mortality of marine turtles and, where appropriate, increase natural survivorship, including through developing management strategies with Aboriginal and Torres Strait Islander communities for the sustainable use of marine turtles by:

  (i) reducing bycatch of marine turtles in fisheries

  (ii) facilitating sustainable harvesting of turtles and eggs by Aboriginal and Torres Strait Islander people

  (iii) reducing levels of marine debris

  (iv) reducing mortality of marine turtles during shark control activities

  (v) reducing incidences of boat strike on marine turtles

  (vi) reducing lighting impacts and entanglement incidences from Pearl Farming and other Aquaculture activities

  (vii) reducing potential impacts from Department of Defence activities.

(b) To develop programs and protocols to monitor marine turtle populations in Australia, assess the size and status of those populations, the causes of their mortality and address information gaps by:

  (i) monitoring key populations and strandings of marine turtles

  (ii) measuring recovery

  (iii) facilitating the genetic identification of Australian marine turtle populations and their ecology.

(c) To manage factors that affect marine turtle nesting by:

  (i) reducing light pollution in the marine environment

  (ii) ensuring minimal impacts on turtle habitat (including nesting beaches) from tourism and recreational activities

  (iii) managing vehicle access to nesting beaches

  (iv) minimising faunal predation of marine turtle eggs.

(d) To identify and protect habitats that are critical for the survival of marine turtles by:

(i) ensuring that activities impacting land use and water quality on or in proximity to marine turtle habitat are subject to an environmental impact assessment and the development of best practice coastal management guidelines across Queensland

(ii) protecting critical marine turtle benthic and seagrass habitats

(iii) managing oil spills and operational discharges by lead agencies and appropriate environmental assessment of related activities

(iv) ensuring soft start procedures are implemented in seismic surveys and monitoring literature on the effect of noise on marine turtles.

(e) To communicate the results of recovery actions and involve and educate stakeholders by:

(i) reviewing the Marine Turtle Recovery Plan and evaluating its effectiveness

(ii) raising awareness and involvement of the community

(iii) raising awareness in northern Australian Indigenous communities.

(f) To support and maintain existing agreements and develop new collaborative programs with neighbouring countries for the conservation of shared turtle populations by:

(i) the Commonwealth Government maintaining existing and developing new bilateral or multilateral agreements to ensure that international conservation and management of marine turtles is consistent with domestic policies and international treaty obligations.

Appendix 6. Coordinator-General's recommendations

This appendix includes general recommendations, made under section 35(4) of the SDPWO Act. The recommendations relate to the applications for development approvals for the project.

While the recommendations guide the assessment managers[93] in assessing the development applications, they do not limit their ability to seek additional information nor power to impose conditions on any development approval required for the project.

Recommendation 1. Trusteeship of William Guise Foxwell Park

The Gold Coast City Council has jurisdiction for this recommendation.

To facilitate the development of the Gold Coast International Marine Precinct, I recommend that Gold Coast City Council relinquish trusteeship of William Guise Foxwell Park.

Recommendation 2. Sale of William Guise Foxwell Park

The Department of Natural Resources and Mines has jurisdiction for this recommendation.

To facilitate the development of the Gold Coast International Marine Precinct, I recommend that commence the necessary processes to enable the purchase of William Guise Foxwell Park by the proponent.

Recommendation 3. Hinterland Model Flying Club

The Gold Coast City Council has jurisdiction for this recommendation.

I recommend that the Gold Coast City Council and the proponent work with the Hinterland Model Flying Club to find an alternative site for their activities.

Recommendation 4. Compliance with the Queensland Planning Provisions

The Gold Coast City Council has jurisdiction for this recommendation.

I recommend that the proponent work with GCCC with regards to the timing of the section 242 application and if necessary, update the GCIMP development code to reflect the latest version of the QPP.

Recommendation 5. Resource entitlement under the Land Act 1994

The Department of Natural Resources and Mines has jurisdiction for this recommendation.

I recommend that the Department of Natural Resources and Mines work with the proponent to ensure the timely provision of a resource entitlement under the Land Act 1994.

Recommendation 6. Resource entitlement under the Water Act 2000

The Department of Natural Resources and Mines has jurisdiction for this recommendation.

[93] For a definition of 'assessment manager' refer to the Glossary on page 189 of this report.

I recommend that the Department of Natural Resources and Mines work with the proponent to ensure the timely provision of a resource entitlement under the Water Act 2000.

Recommendation 7. Quarry material allocation for dredging

The Department of Environment and Heritage Protection has jurisdiction for this recommendation.

I recommend that the Department of Environment and Heritage Protection work with the proponent to ensure the timely provision of a quarry material allocation for dredging under the Coastal Protection and Management Act 1995,

Recommendation 8. Employment strategies

The Gold Coast City Council has jurisdiction for this recommendation.

To enable the Gold Coast community to maximise the social benefits from the development of the proposed GCIMP, I encourage the proponent to develop strategies for employing:

- a local workforce
- members of vulnerable and disadvantaged groups, including Indigenous people, people with a disability, women and people from 'non-English speaking backgrounds'.

Recommendation 9. Transport infrastructure impact mitigation

The Department of Transport and Main Roads has jurisdiction for this recommendation.

To formalise arrangements about transport infrastructure works, contributions and road-use management strategies detailed and required under the impact mitigation program, the proponent may enter into an infrastructure agreements with DTMR and/or the relevant LGA.

The principles on which the trip calculations are based should include:

- precincts that contain land uses which are predominantly exempt, self and/or code assessable under the GCPS, Waterfront Precinct of the Coomera LAP are not to be included in the calculations
- land uses which are impact assessable under the GCPS, or are new land uses not currently contemplated by the GCPS, are to be incorporated into the trip calculations applying the highest trip generation land use and/or the subsequent next highest land use where GFA limits apply.

The infrastructure agreement/s should incorporate the following:

(a) project-specific works and contributions required to upgrade impacted road infrastructure and vehicular access to project sites as a result of the proponent's use of state-controlled and local roads by project traffic

(b) project-specific contributions towards the cost of maintenance and rehabilitation, to mitigate impacts on state-controlled and/or local road pavements or other infrastructure

(c) infrastructure works and contributions associated with shared (cumulative) use of state-controlled and local road infrastructure by other projects subject to an EIS

(d) performance criteria that detail protocols for consultation about reviewing and updating project-related traffic assessments and impact mitigation measures that are based on actual traffic volume and impacts, should previously advised traffic volumes and/or impacts change

(e) the proponent's undertaking to fulfil all commitments as detailed in the 'Table for listing RMP commitments'.

To ensure efficient processing of the project's required transport-related permits and approvals, the proponent should, no later than three (3) months, or such other period agreed in writing with DTMR and the relevant LGA, prior to the commencement of significant construction works or project-related traffic:

(a) submit detailed drawings of any works required to mitigate the impacts of project-related traffic to DTMR and the relevant LGA for review and approval.

(b) obtain all relevant licenses and permits required under the Transport Infrastructure Act 1994 for works within the state-controlled road corridor (s33 for road works approval, s62 for approval of location of vehicular accesses to state roads and s50 for any structures or activities to be located or carried out in a state-controlled road corridor).

(c) prepare a Heavy Vehicle Haulage Management Plan and obtain permits for any excess mass or over-dimensional loads for all phases of the project in consultation with DTMR's Heavy Vehicles Road Operation Program Office, the Queensland Police Service and the relevant LGA, as required by the *Transport Operations (Road Use Management) Act 1995*.

(d) prepare Traffic Management Plan/s (TMP) in accordance with DTMR's Guide to preparing a Traffic Management Plan.[94] A TMP must be prepared and implemented during the construction and commissioning of each site where road works are to be undertaken, including site access points, road intersections or other works undertaken in the state-controlled road corridor.

[94] Available from TMR Regional Offices or Planning Management Branch, Brisbane

Acronyms and abbreviations

Acronym	Definition
µS/cm	microsiemens per centimetre
ACH Act	*Aboriginal Cultural Heritage Act 2003* (Qld)
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
Apia Convention	Convention on Conservation of Nature in the South Pacific
BONN Convention	Convention of Migratory Species
CAMBA	China–Australia Migratory Bird Agreement
CBD	Convention on Biological Diversity
CEMP	construction environment management plan
CHMP	cultural heritage management plan
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLR	Contaminated Land Register
dB(A)	decibels measured at the 'A' frequency weighting network
DATSIMA	Department of Aboriginal and Torres Strait Islander and Multicultural Affairs
DCS	Department of Community Safety
DEEDI	The former Department of Employment, Economic Development and Innovation
DERM	The former Department of Environment and Resource Management
DOC	Department of Communities (Qld)
DSDIP	Department of State Development, Infrastructure and Planning
DTMR	Department of Transport and Main Roads (Qld)
DSQ	Disability Services Queensland
EA	environmental authority
EIS	environmental impact statement
EMP	environmental management plan
EMR	Environmental Management Register
EP	equivalent persons
EP Act	*Environmental Protection Act 1994* (Qld)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EPP	Environmental Protection Policy (water, air, waste, noise)
EPP (Air)	Environmental Protection (Air) Policy 2008
EPP (Noise)	Environmental Protection (Noise) Policy 2008
EPP (Water)	Environmental Protection (Water) Policy 2009
ERA	environmentally relevant activity
ESA	environmentally sensitive area
FTE	full-time equivalent
GBRMP	Great Barrier Reef Marine Park

Acronym	Definition
GBRWHA	Great Barrier Reef World Heritage Area
GFC	global financial crisis
GHG	greenhouse gas
IAS	initial advice statement
IRTC	inter-regional transport corridor
JAG	Queensland Department of Justice and Attorney-General
JAMBA	Japan–Australia Migratory Bird Agreement
km	kilometre
kV	kilovolt
kPa	kilopascal
L_{A1}	those noise levels that are exceeded for one per cent of each one-hour sample period
L_{Aeq}	the average A-weighted sound pressure level of a continuous steady sound that has the same mean square sound pressure as a sound level that varies with time
L_{Amax}	the maximum average A-weighted sound pressure measured over a specified period of time
LAN,T	statistical descriptor for the variation of noise
max $L_{PZ,15\ min}$	the maximum value of the Z-weighted sound pressure level measured over 15 minutes
MCU	material change of use
m	metre
mg/L	milligrams per litre of liquid/gaseous liquid
M/j	megajoules
ML	megalitres
MNES	matters of national environmental significance
NC Act	*Nature Conservation Act 1992* (Qld)
NEPC	National Environmental Protection Council
NEPM	national environment protection measure
NGA	National Greenhouse Accounts
NGAF	National Greenhouse Accounts Factors
NT agreement	native title agreement
PM_{10}	particulate matter with equivalent aerodynamic diameter less than 10μm
$PM_{2.5}$	particulate matter with equivalent aerodynamic diameter less than 2.5μm
PPV	peak particle velocity, which is a measure of ground vibration magnitude and is the maximum instantaneous particle velocity at a point during a given time interval in mms^{-1}
QASSIT	Queensland Acid Sulfate Soils Investigation Team
QASSMAC	Queensland Acid Sulfate Soils Management Advisory Committee
QGEOP	Queensland Government Environmental Offsets Policy
QH	Queensland Health
QWC	Queensland Water Commission

Acronym	Definition
QWQG	*Queensland Water Quality Guidelines*
RE	regional ecosystem
REDD	Regional Ecosystem Description Database
RIA	road impact assessment
ROL	reconfiguration of lot
RMP	road-use management plan
ROKAMBA	Republic of Korea–Australia Migratory Bird Agreement
SDPWO Act	*State Development and Public Works Organisation Act 1971* (Qld)
SDWPO Regulation	State Development and Public Works Organisation Regulation (Qld)
SEIS	supplementary environmental impact statement
SEWPaC	Australian Government Department of Sustainability, Environment, Water, Population and Communities
SIA	social impact assessment
SIAU	Social Impact Assessment Unit
SLA	statistical local area
SPA	*Sustainable Planning Act 2009* (Qld)
SPP	state planning policy
SSBV	state significant biodiversity values
TDS	total dissolved solids
TMP	traffic management plan
TOR	terms of reference
TSP	total suspended particles
VM Act	*Vegetation Management Act 1999* (Qld)
WMP	waste management plan
WRP	water resource plan

Glossary

Term	Definition
assessment manager	For an application for a development approval, means the assessment manager under the *Sustainable Planning Act 2009* (Qld).
Australian height datum	The datum that sets mean sea level as zero elevation. Mean sea level was determined from observations recorded by 30 tide gauges around the coast of the Australian continent for the period 1966–1968.
adopted middle thread distance	The distance from the mouth of the watercourse or the confluence of the watercourse with the main watercourse measured along the middle of the watercourse.
annual exceedance Probability (AEP)	The probability that a given rainfall total accumulated over a given duration will be exceeded in any one year.
best practice environmental management	Is defined in the Queensland *Environmental Protection Act 1994* as the best practice environmental management of an activity is the management of the activity to achieve an ongoing minimisation of the activity's environmental harm through cost-effective measures assessed against the measures currently used nationally and internationally for the activity.
bilateral agreement	The agreement between the Australian and Queensland governments that accredits the State of Queensland's EIS process. It allows the Commonwealth Environment Minister to rely on specified environmental impact assessment processes of the state of Queensland in assessing actions under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth).
boat wash	Boat wash is the turbulence created by your boat as it moves through the water. Wash size and influence is affected by the amount of water your boat displaces, the boats speed, it's planning attitude and other factors such as water depth.
construction areas	The construction worksites, construction car parks, and any areas licensed for construction or on which construction works are carried out.
controlled action	A proposed action that is likely to have a significant impact on a matter of national environmental significance; the environment of Commonwealth land (even if taken outside Commonwealth land); or the environment anywhere in the world (if the action is undertaken by the Commonwealth). Controlled actions must be approved under the controlling provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth).
controlling provision	The matters of national environmental significance, under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth), that the proposed action may have a significant impact on.
convention of migratory species (BONN convention)	Is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. The Convention aims to conserve terrestrial, aquatic and avian migratory species throughout their range.

Convention on Conservation of Nature in the South Pacific (Apia Convention)	The objective of the Convention is to take action for the conservation, utilisation and development of the natural resources of the South Pacific region through careful planning and management for the benefit of present and future generations.
convention on international trade in endangered species of wild fauna and flora (CITES)	Is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.
coordinated project	A project declared as a ' coordinated project' under section 26 of the SDPWO Act. Formerly referred to as 'significant projects'.
Coordinator-General	The corporation sole constituted under section 8A of the *State Development and Public Works Organisation Act 1938* and preserved, continued in existence and constituted under section 8 of the SDPWO Act.
development	Part Three, Section Seven of the *Sustainable Planning Act 2009* defines development as the following: *Development* is any of the following— a) carrying out building work; b) carrying out plumbing or drainage work; c) carrying out operational work; d) reconfiguring a lot; e) making a material change of use of premises.
environment	As defined in Schedule 2 of the SDPWO Act, includes: f) ecosystems and their constituent parts, including people and communities g) all natural and physical resources h) the qualities and characteristics of locations, places and areas, however large or small, that contribute to their biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community i) the social, economic, aesthetic and cultural conditions that affect, or are affected by, things mentioned in paragraphs (a) to (c).
environmental effects	Defined in Schedule 2 of the SDPWO Act as the effects of development on the environment, whether beneficial or detrimental.
environmentally relevant activity (ERA)	An activity that has the potential to release contaminants into the environment. Environmentally relevant activities are defined in Part 3, section 18 of the *Environmental Protection Act 1994* (Qld).
essential habitat	As defined in the *Vegetation Management Act 1999*, essential habitat, for protected wildlife, means an area of vegetation shown on the regional ecosystem map or remnant map as remnant vegetation: (a) that has at least three essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database; or (b) in which the protected wildlife, at any stage of its life cycle, is located.

essential habitat factor	As defined in the *Vegetation Management Act 1999*, for protected wildlife, is a component of the wildlife's habitat, including, for example, a landform, pollinator, regional ecosystem, soil and water, that is necessary or desirable for the wildlife at any stage of its lifecycle.
estuarine wetland	Wetlands with oceanic water sometimes diluted with freshwater run-off from the land.
gross regional product	Is a measure of the size or net wealth generated by a region including the sum of all industry gross product plus ownership of dwellings.
highest astronomical tide	The highest level which can be predicted to occur under average meteorological conditions and any combination of astronomical conditions. In Australia HAT is calculated as the highest level from tide predictions over the tidal datum epoch (TDE), this is currently set to 1992 to 2011.
imposed condition	A condition imposed by the Queensland Coordinator-General under section 54B of the SDPWO Act. The Coordinator-General may nominate an entity that is to have jurisdiction for the condition.
initial advice statement (IAS)	A scoping document, prepared by a proponent, that the Coordinator-General considers in declaring a coordinated project under Part 4 of the SDPWO Act. An IAS provides information about: a) the proposed development b) the current environment in the vicinity of the proposed project location c) the anticipated effects of the proposed development on the existing environment d) possible measures to mitigate adverse effects.
marine bioregional plans	Marine bioregional plans have been developed for four of Australia's marine regions - South-west, North-west, North and Temperate East. Marine Bioregional Plans will help improve the way decisions are made under the Environment Protection and Biodiversity Conservation Act 1999, particularly in relation to the protection of marine biodiversity and the sustainable use of our oceans and their resources by our marine-based industries.
matters of national environmental significance	The matters of national environmental significance protected under the *Environment Protection and Biodiversity Conservation Act 1999*. The eight matters are: a) world heritage properties b) national heritage places c) wetlands of international importance (listed under the Ramsar Convention) d) listed threatened species and ecological communities e) migratory species protected under international agreements f) Commonwealth marine areas g) the Great Barrier Reef Marine Park h) nuclear actions (including uranium mines).

nominated entity (for an imposed condition for undertaking a project)	An entity nominated for the condition, under section 54B(3) of the SDPWO Act.
palustrine wetland	Wetlands that are primarily vegetated non-channel environments of less than 8 hectares. They include billabongs, swamps, bogs, springs, soaks etc. and have more than 30% emergent vegetation.
piling activity/ies	Driving one and/or multiple structural supports into the ground below the waterline.
properly made submission (for an EIS or a proposed change to a project)	Defined under section 24 of the SDPWO Act as a submission that: a) is made to the Coordinator-General in writing b) is received on or before the last day of the submission period c) is signed by each person who made the submission d) states the name and address of each person who made the submission e) states the grounds of the submission and the facts and circumstances relied on in support of the grounds.
proponent	The entity or person who proposes a coordinated project. It includes a person who, under an agreement or other arrangement with the person who is the existing proponent of the project, later proposes the project.
protected matters	A 'matter protected' as that term is defined in section 34 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth)) by a provision of Part 3 of the EPBC Act for which this approval has effect.
Ramsar convention	The Convention on Wetlands (Ramsar Convention) is an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the 'wise use', or sustainable use, of all of the wetlands in their territories.
real damage	Real damages would exist where flooding associated with a development causes material damage (i.e. where over floor flooding occurs as a result of the development).
recovery plans	Recovery plans set out the research and management actions necessary to stop the decline of, and support the recovery of, listed threatened species or threatened ecological communities. The aim of a recovery plan is to maximise the long term survival in the wild of a threatened species or ecological community.
reduced levels	The height or elevation above the point adopted as the site datum for the purpose of establishing levels.
referrable wetland	A referral wetland is an area shown as a wetland on a map of 'referrable wetlands', which is a document approved by the chief executive (environment) under the Sustainable Planning Regulation 2009
Significant project	A project declared (prior to 21 December 2012) as a 'significant project' under section 26 of the SDPWO Act. Projects declared after 21 December 2012 are referred to as 'coordinated projects'.

soft start procedures	Initiated at the commencement of all marine piling activities by piling at low energy levels and then build up to full impact force. The first five impacts from the piling activity must be at no more than 50% of full hammer weight (e.g. a hammer with an adjustable stroke height of 0.6 metres at least 5 times during a 'soft start procedure), to encourage animals to move away from subsequent blows.
stated condition	Conditions stated (but not enforced by) the Coordinator-General under sections 39, 45, 47C, 49, 49B and 49E of the SDPWO Act. The Coordinator-General may state conditions that must be attached to a: a) development approval under the *Sustainable Planning Act 2009* b) proposed mining lease under the *Mineral Resources Act 1989* c) draft environmental authority (mining lease) under Chapter 5 of the *Environmental Protection Act 1994* (EPA) d) proposed petroleum lease, pipeline licence or petroleum facility licence under the *Petroleum and Gas (Production and Safety) Act 2004* e) non-code compliant environmental authority (petroleum activities) under Chapter 4A of the EPA.
State significant biodiversity value	For the purposes of this policy, State significant biodiversity values are those values listed in Appendix 1 of the 2011 *Queensland Biodiversity Offset Policy*.
sunk infrastructure	A past outlay for infrastructure that has been constructed and for which costs cannot be recovered or altered by current or future actions.
threat abatement plan	Threat abatement plans provide for the research, management, and any other actions necessary to reduce the impact of a listed key threatening process on native species and ecological communities. Implementing the plan should assist the long term survival in the wild of affected native species or ecological communities.

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