



TOONDAH HARBOUR

CHAPTER 22 SUSTAINABILITY



22. Sustainability

22.1. Introduction

Ecologically sustainable development (ESD), means using, conserving and enhancing the community's resources so that ecological processes on which life depends are maintained and quality of life for both present and future generations is increased (Commonwealth Government, 1992). Simply, it is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (United Nations World Commission on Environment and Development, 1987).

An ecologically sustainable approach to project development takes an integrated and long-term view in considering the wider economic, social and environmental implications of decisions and actions for the community and environment, locally and nationally.

The National Strategy for Ecological Sustainable Development (NSES; Commonwealth Government, 1992) sets the following core objectives for achieving ESD:

- To enhance individual and community well-being by following a path of economic development that safeguards the welfare of future generations;
- To provide for equity within and between generations; and
- To protect biological diversity and maintain essential ecological processes and life-support systems.

These core objectives should be considered in balance with the following guiding principles to pursue the goal of ESD:

- Decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations.
- Where 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.
- The global dimension of environmental impacts of actions and policies should be recognised and considered.
- The need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised.
- The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised.
- Cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms.
- Decisions and actions should provide for broad community involvement on issues which affect them.

These principles are considered to be of equal weight. The strategy provides further elaboration of relevance to the Project within the Urban and Transport Planning Part 2 Sectoral Issues. The objectives under this sectoral response are as follows:

- To promote urban forms which minimise transport requirements, and improve the efficiency of land supply and infrastructure provision;
- To encourage the future development of urban transport systems which provide opportunities to limit the use of fossil fuels;
- To promote subdivision and road design patterns that provide the greatest potential to utilise energy efficiency dwelling design, with provision for and use of public transport modes; and

- To improve the amenity of local urban areas.

Importantly, the NSESD recognises sustainability within the process and design of development in addition to the impacts of development.

22.1.1 Scope of Study

Specific requirements to address the EPBC Act EIS Guidelines and other legislative requirements include describing how the following sustainability issues have been applied through Project design and will continue to be applied through construction and operation:

- a) Decision making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;
- b) 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;
- c) The principle of 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; and
- d) The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making.

This chapter primarily responds to principles (a) and (c). The long-term decision making by the Queensland Government in their decision to determine a PDA and make the development scheme provides background to principle (a) and (c). Details of how the Project will be designed, built and operated to incorporate the PDA requirements also shows consideration of these principles.

With respect to (b) and (d), detailed evaluation of the potential impacts to ecosystems, biodiversity and a range of other environmental values are assessed in detail by this EIS, particularly with regards to the net effects on MNES. As such, they are cross referenced in this section, rather than providing a duplicate or detailed elaboration on the existing material. Other parts of the EIS address in more detail the principles (b) and (d) and are cross-referenced in this chapter.

22.1.2 PDA Development Scheme

Under the PDA Development Scheme Land Use Plan, development must support sustainable outcomes, which are as follows:

- Ensure landscaping and building design are of a high standard, providing adequate safety, privacy, comfort and responsiveness to the sub-tropical climate and coastal hazards;
- Ensure development has regard to environmental and landscape values;
- Ensure ecosystems and natural physical processes are maintained and incorporated as features in the overall urban form;
- Minimise potable water usage where possible and enhance the visual amenity of the locality and streetscape; and
- Utilise energy efficient, climatically responsive design including appropriate solar orientation, shading, cross ventilation, natural lighting and passive cooling techniques (Development may employ the use of a ratings tool to demonstrate compliance with sustainability criteria).

The PDA seeks sustainability responses within the built environment to improve operational sustainability. It does so through measures to limit resource use during occupation through design and materials. The policy also has regard for

the environmental and landscape values that are being assessed in this Draft EIS. The desired outcomes through the implementation of this document are as follows:

- **Water:** reduced potable water use by 20% compared to regulatory requirements.
- **Community:** reduced reliance on motor vehicles and increased walking, cycling and use of public transport as well as access to community facilities and safe and accessible buildings.
- **Biodiversity and ecosystems:** development has sought to protect or enhance the health and sustainability of natural systems and encourage biodiversity and rehabilitation of degraded sites.
- **Waste:** significant measures have been taken to reduce waste generation and reuse or recycle 60% of construction and demolition waste.
- **Energy:** reduced peak energy demand by greater than 30% and reduced greenhouse gas production by greater than 20% compared with minimum compliance.
- **Materials:** environmentally responsible materials have been used to lower environmental impacts.

22.2. Sustainability Responses Provided in the Toondah Harbour EIS

Sustainability covers a very broad range environmental resources and impacts, most of which are addressed in detail by specialist experts for this EIS. Table 22-1 presents the aspects of ecologically sustainable development, described in the Draft EIS Guidelines and the PDA development scheme, and provides a summary and cross reference for where within the EIS it is addressed.

Table 22-1: ESD Summary and Cross-reference for EIS Aspects.

Guideline / Requirement	EIS Chapter	Summary
Commonwealth Draft EIS guideline sustainability principles (b) and (d)		
(b) 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.	Chapters 7 - 18	<p>Evidence based desktop and field scientific and engineering assessment has been performed and reporting is provided in these chapters. Assessment of potential environmental harm to values at risk from the Project includes:</p> <ul style="list-style-type: none"> ▪ Contaminated Land; ▪ Sediment Quality and Acid Sulfate Soils; ▪ Water Quality and Hydrology; ▪ Groundwater Quality and Quantity; ▪ Air Quality; ▪ Terrestrial and Underwater Noise and Vibration; ▪ Terrestrial Ecology; ▪ Marine Ecology; ▪ Migratory and Threatened Shorebirds; ▪ Commercial and Recreational Fisheries
(d) The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making.	Section 1.4 and 1.5 and Chapters 7 - 22	The Project is physically located where a number of key economic, social and geographic advantages coincide, as outlined in Section 1.4 and 1.5. The proposed master plan, development footprint and construction methods have been refined and optimised over several years to balance economic and engineering feasibility with the best possible environmental outcomes.

Guideline / Requirement	EIS Chapter	Summary
Queensland State		
1. Ensure landscaping and building design are of a high standard, providing adequate safety, privacy, comfort and responsiveness to the sub-tropical climate and coastal hazards.	Chapter 2, Section 2.7	The project description and design provides the conceptual philosophy for the built environment around the port, residential areas and their accommodation of the natural values and protected areas. Landscape and amenity responses will identify how the urban design responds to sustainability principles, but do not provide detailed building design responses as these are not under assessment during this approval.
2. Ensure development has regard to environmental and landscape values.	Section 2.7	Urban design to complement and limit impacts to the environmental and landscape will be incorporated into project design.
3. Ensure ecosystems and natural physical processes are maintained and incorporated as features in the overall urban form.	Chapters 7-18	Evidence based desktop and field scientific and engineering assessment has been performed and reporting is provided in these chapters. Assessment of potential environmental harm to values at risk from the Toondah Harbour project includes: <ul style="list-style-type: none"> ▪ Contaminated Land; ▪ Sediment Quality and Acid Sulfate Soils; ▪ Water Quality and Hydrology; ▪ Groundwater Quality and Quantity; ▪ Air Quality; ▪ Terrestrial and Underwater Noise and Vibration; ▪ Terrestrial Ecology; ▪ Marine Ecology; ▪ Migratory and Threatened Shorebirds; and ▪ Commercial and Recreational Fisheries.
4. Minimise potable water usage where possible and enhance the visual amenity of the locality and streetscape.	Section 2.7	This section addresses the urban design intent and how it complements the amenity of the area and its streetscape. Sight lines and the relationship of each land use with the surrounding environment are considered, in context with the needs and values that will be addressed at later stages of the development approvals process.
5. Utilise energy efficient, climatically responsive design including appropriate solar orientation, shading, cross ventilation, natural lighting and passive cooling techniques (Development may employ the use of a ratings tool to demonstrate compliance with sustainability criteria).	N/A	Detailed assessment of the buildings against ecologically sustainable and energy efficiency building standards will be addressed at the Building Works stage. The Proponent is committed to incorporating sustainable energy sources wherever possible including the use of solar panels and reduction of heat islands through rooftop gardens and pocket parks.

22.3. Assessment Methodology

A desktop review has been conducted of the available contributing requirements that enforce sustainable practices, along with assessments of the costs and benefits. There are a number of national methodologies available for urban and

infrastructure sustainability assessment, however the majority of these are intended to analyse development at a very high level of construction and operational detail. The purpose of this EIS is not to include a detailed assessment of the construction and operation; however these methodologies do remain applicable for conceptual analysis.

22.3.1 Urban Development Institute of Australia - EnviroDevelopment

The Urban Development Institute of Australia (UDIA) has developed and branded the EnviroDevelopment scheme which provides certification for compliance with standards that are subdivided into development types. The Toondah Harbour project would fall into a number of categories for this assessment tool:

- Master-planned Communities;
- Multi-Unit Residential;
- Mixed Use;
- Retail; and
- Commercial.

The certification process targets a number of environmental values (Ecosystems, Waste, Energy, Materials, Water and Community) encompassed broadly by sustainability, but does not attempt to unify these in a holistic approach that is characteristic of sustainability objectives.

22.3.2 Green Building Council Australia - Green Star Rating

The Green Building Council Australia offers certification for meeting design, construction and operation standards with an emphasis on buildings, but includes a Communities Green Star rating that incorporates Governance, Liveability, Economic Prosperity, Environment and Innovation. As with EnviroDevelopment it is a branded system that is intended to focus design, construction and operation of master-planned or precinct scale developments on sustainable outcomes that translate into lower impacts and resource use and increased social and economic benefits. It then offers this as a marketing endorsement to increase the attractiveness and value of the development for owners and tenants.

22.3.3 NABERS

The National Australian Built Environment Rating System (marketed as NABERS) is a sustainability rating system for the operation of buildings and while in common use, it is intended for detailed facility management at a level that is not within the scope of this EIS. It does provide guidance on the objectives where the overall design of the masterplan may contribute to more easily achieving a rating against the standard.

22.3.4 Regulatory Approvals

Currently the Queensland Government and to a limited extent via the Planning Act, RCC, have a role in assessing sustainability in accordance with the Land Use Plan embedded within the PDA development scheme. In addition, the development scheme provides detailed overall sustainability outcomes in the Implementation Strategy.

22.4. Baseline Sustainability

The Synergies Economic Consulting cost/benefit analysis of the Project has reviewed the economic activity across the community and commercial facilities within the existing site (refer to Chapter 21 and Appendix 2-R). It is useful to examine the sustainability of the existing land use in the context of the current uses and regional housing, transport and service needs. The existing land use can be described as the following:

- The continued operation of vehicle and passenger ferry services between the Toondah Harbour Ferry Terminal and Minjerribah, with associated use of the swing basin and car parking facilities;
- Continued provision of the parkland facilities located in GJ Walter Park;
- Continued use of the Toondah Harbour public boat ramp by recreational and small commercial vessel users;

- The continuation of current activities within the Council-owned office facilities located within the PDA (the trade college); and
- The continued provision of foraging habitat for the migratory and threatened species in the MBRS that lies within the PDA (noting that this area is materially impacted by development and activities occurring in the surrounding areas).

Currently the terrestrial component of the PDA does not offer remnant environmental values as it has been disturbed by ongoing low density residential and administrative/commercial use, land converted to parkland, port operations and car parks (refer to Chapter 15). It is also the location of impacts associated with the original purpose of the port, being services to the mining interests on Stradbroke Island. This includes dumps for early dredge material and spaces for ore loading infrastructure.

Much of the terrestrial site, with the exception of the coastal mudflats and mangroves included in the area, is brownfield with an overall low or constrained social and economic benefit to the Cleveland area while causing significant constraints to social and economic development in the Moreton Bay Islands served by the port. The Ramsar wetlands and estuarine habitat within the PDA are currently disturbed by the existing passage of ferry and recreational vessels, along with stormwater runoff and human activities. In addition, the Fison Channel requires ongoing maintenance dredging, which has impacts to marine life as well as demands for placement of further dredge material.

Despite these ongoing impacts, the need for the PDA arose out of the low economic and social returns from the existing levels of development and associated economic activity, along with constraints and impacts to economic activity and social amenity within the Moreton Bay Islands.

With regard to the intertidal and marine habitats that are encompassed or potentially impacted by the Project, it is noted that the Project footprint will occupy less than 0.1% of the total area of habitat available throughout Moreton Bay. It is estimated that currently Moreton Bay wetlands hold habitat with a holding capacity well in excess of the current numbers of migratory and marine species of shorebirds. Also, that a decline in numbers encountered in the area is not likely to result from factors encountered in the Moreton Bay area.

22.5. Sustainability of the PDA

Substantial measures have been undertaken to ensure that the construction and operation of the Project will be ecologically sustainable.

The primary environmental impacts from the Project will include:

- Direct loss of wetland habitat due to the construction of the Project, comprising:
 - 3.4 ha of mangroves;
 - 37 ha of seagrass, including 11.8 ha in the Fison Channel; and
 - 8.8 ha of unvegetated sandbanks and mudflats, excluding 16.2 ha in the Fison Channel which will be retained post dredging.
- The areas of clearing represent 0.03% of mangroves, 0.15% of seagrass and 0.18% of sandbanks and mudflats in the MBRS.
- Dredging and reclamation within the Project footprint will result in a permanent direct impact on 28.9 ha of tidal flat habitat that provides feeding habitat for migratory shorebird species. While the loss of habitat will adversely affect feeding habitat and area of occupancy for a number of species including the critically endangered eastern curlew and vulnerable bar-tailed godwit, it corresponds to only 0.29% of the approximately 10,000 ha of tidal flat habitat within Moreton Bay or 0.6% of the approximately 4,681 ha of habitat in the MBRS.

These impacts have been minimised through optimisation of project design, including:

- Keeping the proposed widening and deepening of the Fison Channel and turning basin to the minimum required for safe navigation of multiple vehicle and passenger ferries to and from the harbour. Any reduction in channel widths or depths would impact on the safety and utility of the harbour. The extension will also align with the existing channel as much as possible to minimise dredged material volumes;
- Designing reclamation areas with the intent of achieving a net balance between dredging and reclamation volumes. Imported fill material requirements have been minimised with quarry sourced material generally only required for rock armouring of seawalls and stabilisation of dredge material;
- Ensuring the design of the development does not impact on the Cassim Island and Nandeebie Claypan high tide roost sites. Design features to ensure impacts are avoided include:
 - Separating the proposed landform from Cassim Island;
 - Including a non-navigable culvert through the eastern arm of the development to disperse tidal flows; and
 - Providing a minimum 250 m buffer between high tide roosting areas for threatened species at Cassim Island and any dwellings or sources of disturbance — the Nandeebie Claypan is separated from dwellings or sources of disturbance by more than 300 m;
- Separating recreational boating and harbour uses to improve safety and directing recreational vessel movement away from the Cassim Island high tide roost site;
- Incorporating safe fauna movement features within the terrestrial components of the Project footprint including a large fauna underpass connecting koala habitat in GJ Walter Park to habitat in other coastal park areas to the south of the PDA;
- Incorporating fish friendly structures in the design of the marine structures and revetment walls.

The Project's environmental offsets strategy outlined in Chapter 29 will also provide an overall benefit to migratory birds and wetland habitats in the MBRS.

Further design optimisation will occur throughout the lifecycle of the Project to ensure it is consistent with the PDA development scheme sustainability outcomes. This includes:

- Ensure landscaping and building design are of a high standard, providing adequate safety, privacy, comfort and responsiveness to the sub-tropical climate and coastal hazards;
- Ensure development has regard to environmental and landscape values;
- Ensure ecosystems and natural physical processes are maintained and incorporated as features in the overall urban form;
- Minimise potable water usage where possible and enhance the visual amenity of the locality and streetscape; and
- Utilise energy efficient, climatically responsive design including appropriate solar orientation, shading, cross ventilation, natural lighting and passive cooling techniques.

Sustainability is also tied to increased social and economic benefit. It is the balance of the Project's unavoidable environmental impacts, over the social benefits to the users and the wider economy.

SEQ is expected to continue to experience strong population growth through to 2041. While Redland City LGA is expected to accommodate only a relatively small share of this growth, there is a concern that the local economy will suffer from losses of trade to other regions that are expanding faster and offer stronger attractions. In addition, for the expected 36,000 migrants to the area there will be a need for over 17,000 dwellings. Toondah Harbour offers a higher density yet high amenity location to accommodate the expected demand for more diverse housing stock, close to public transport, in addition to ensuring social services and community facilities are aligned with the growth. Toondah Harbour will create a community hub closely linked to the existing Cleveland CBD and designed to support the growth of the CBD

rather than cannibalise it. It increases the opportunity for lower impact medium to high density development to displace the use of lower density inland urban developments which cannot feasibly achieve the high levels of amenity and community connections.

The Project provides a vehicle by which the port facilities can be moved to a new funding model where the existing port had previously relied heavily on the now closed North Stradbroke sand mining operations. Without the ongoing use and financial support of the North Stradbroke sand mines, there were no adequate ongoing arrangements to continue the additional transport services for the Moreton Bay Island populations and in particular, Minjerribah. With the cessation of mining, the Minjerribah community, the State Government and RCC are actively seeking ways to increase the island's capacity as a visitor destination. The Project addresses transport constraints for island residents and visitors at no cost to the ratepayer or taxpayer.

22.5.1 Sustainability in Design

The Toondah Harbour Project has been and will be designed incorporating industry leading sustainability practices. Sustainability measures to be incorporated include:

- Recognised industry sustainability accreditation measures will be used to benchmark developments and ensure compliance at an individual project level.
- Better than best practice stormwater management will be applied that will support healthy ecosystems by improving water quality of site runoff.
- Passive design principles will be embedded into the building design. Building orientation will respond to solar access, shade, prevailing breezes, and neighbouring buildings.
- Design for natural ventilation will greatly reduce the need for artificial cooling. Single loaded building forms, breaks in building mass and open recesses within double loaded building forms are important elements in improving natural ventilation opportunities in larger residential building types.
- Solar protection on external windows, facades and outdoor living spaces will be provided to improve environmental performance.
- Operable and fixed screening and generous roofs will enhance the subtropical character and contribute to the quality of the streetscape. Operable screening will also provide important climatic responsiveness from hot western sun, storm-fronts and winter winds, especially to foreshore residences and upper level apartments.
- Robust building material selection, renewable energy including solar power and water harvesting, and water conservation will form part of the suite of sustainable design measures and be utilised where practicable.
- Mitigation of the urban heat island effect will influence the detailed design of the public realm, podiums, roads and roofs with measures including cool roofs and increased planting.
- Good practices for integrating urban development and wetland conservation will be applied including:
 - avoiding impacts on sensitive areas such as high tide roost sites through siting and design of development and public realm features;
 - including wetlands into the urban environment as part of a water sensitive urban design (WSUD) approach; and
 - Incorporating an education centre and signage to support community education and public awareness raising about the importance of wetlands and species that use the MBRS.
- Lighting for buildings and the public realm will be designed and installed in accordance with the National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (DoEE 2020).
- Koala-sensitive design of roads, car parking, public realm and landscape, including provision of an underpass beneath Middle Street, will be included in detailed design of these features. These approaches will be guided by RCC's Koala Conservation Strategy and guidelines such as the Queensland Government's Koala-sensitive Design Guideline (2019) which address koala safe road and transport infrastructure design and placement, traffic calming, koala friendly fencing and safe pool design.

22.6. Promoting Ecologically Sustainable Development

A summary is provided below with a direct response to the EIS Guideline principles of ESD applied to the Project. For the levels of ecological and wider environmental harm and whether they are permanent and/or sustainable, these areas will be referenced rather than providing a full response here.

a. Decision making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations.

The Project was declared a PDA by the Queensland State Government in 2013 as part of a long-term vision for the future residential, commercial and economic development of the Redland City LGA in addition to providing a model to improve and maintain the regional gateway to Minjerribah (North Stradbroke Island) as it transits from a mine dependent economy to a heavier dependence on visitors and tourism. The Project will provide a focal point for RCC to compete with other SEQ regional centres to attract new regional migration and catalyse further economic and social improvements.

This benefit for the region is balanced against whether the coastal impacts of the Project are significant enough to cause reconsideration of the PDA vision, which is largely consistent with the Urban and Transport Planning Strategy of the NSESD.

The EIS addresses sustainability holistically as it is required to consider the potential social, environmental, and economic implications of the Project. Chapter 1 provides further detail on the PDA process and background need and justification, and short- and long-term considerations, which have included economic, environmental, social, and equitable considerations. In addition to the considerations and decisions made during the declaration of the PDA and making of the development scheme, the Proponent for the Project has continued to build upon and reinforce economic, environmental, social, and equitable considerations into all stages of the investigation, planning and development of the Project. Chapter 21 presents the summary of the economic assessment for the Project, while Chapter 20 focuses on social assessment. Chapters 7 through 18 provide the technical information on the current environmental conditions and the anticipated impacts to these. Further, the Project has been assessed and designed to incorporate long-term considerations, such as climate change.

b. 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.

Detailed investigation, assessment and review of impacts to a comprehensive suite of environmental values has been provided in this EIS (refer to Chapters 7-21). Scientific evaluation of these values has been provided and contributes to the overall broad statements in this response. Technical studies incorporated in this EIS have been conducted to the level of detail necessary to reach conclusions on the level of harm and whether they may be minimised or avoided, and, whether they will be temporary or permanent (and during construction and/or operation). Studies have also referenced and utilised up-to-date scientific literature and information, followed available guidelines and legislative requirements, and met industry best practice standards. Overall, none of the values were found to be impacted to the extent where impacts were found to be unsustainable and having permanent and irreparable harm of significance. The limited temporary harm that arises from construction is considered to be manageable and sustainable, in particular with on-site measures to remediate or offset the habitat or ecology that is removed and provide net replacement or gains.

Chapters 15, 16, and 17 provide details on the existing conditions for terrestrial ecology, marine ecology, and migratory shorebirds, as well as the expected short- and long- term impacts from the construction and operation of the Project on

those environments and species that use them. Each of these chapters also include relevant mitigation measures that will be implemented by the Project, and information on the effectiveness of such measures. Chapter 28 outlines the environmental management framework, which provides further information on how the mitigation measures will be implemented, assessed, and reported on. Chapter 29 provides information and detail on proposed offset measures for the Project.

Further, the Project has also been informed by open, transparent and independently peer reviewed science through the Independent Advisory Panel (IAP), convened by the International WaterCentre. The IAP is made up of independent key experts across the scientific, environmental and technical disciplines to provide independent review and advice into the EIS, ensuring the integrity and rigour of the process. The IAP has worked with the Proponent and the EIS team to ensure that the planning, design, methods, analysis, synthesis and recommendations underpinning the EIS have been challenged and verified through the provision of independent scientific advice, review and direction.

c. The principle of 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 current marine transport facilities at Toondah Harbour are considered insufficient and have effectively reached their capacity for transporting vehicles and pedestrians to Minjerribah (North Stradbroke Island) and if not improved are at risk of further dilapidation and becoming unserviceable. The site has not been maintained to meet current and the expected increases in demand and does not have a commercial or government model for adequate funds to maintain, replace or expand as needed. As an example, it is estimated in the cost benefit analysis provided by Synergies that maintenance dredging of the existing channel and turning basin (which do not meet standards) is in the vicinity of \$780,000 per annum, yet there is no source of revenue or funding commitment to meet this cost. The lack of investment benefits existing users who do not have these costs factored into their charges, but the lack of a process to maintain and improve infrastructure will disadvantage future users as the facilities become unserviceable.

In addition, the local Cleveland area is subject to an ageing population and low-density housing continues to dominate, although this is recently starting to change with new medium and high-rise residential apartments being developed on Middle Street and other parts of Cleveland. Nonetheless, Cleveland and the City will have difficulty in attracting and supporting migration to the area without new points of attraction and amenity for residents and workers. Toondah Harbour is an intended catalyst for renewal and provide social, community and economic benefits.

The primary potential for impacts arises from the loss of 0.29% of the Moreton Bay shorebird intertidal habitat, the proximity of the site to high tide roosting sites and the proximity to habitat for marine fauna, including migratory marine fauna (refer to Chapters 16 and 17). The scientific assessment of the risks to these values has found that, with a high level of certainty, the losses to these habitats and the proximity of works and occupation are not expected to significantly impact on MNES and, when considering proposed offsets, will result in an overall benefit to environmental values in Moreton Bay. It is a reasonable conclusion that environmental and biodiversity values are not impacted such that they will remove the health, diversity and productivity of the environment for future generations (Chapters 16, 17 and 24-27). The sustainability of the Project is therefore relatively high when considering the expected advantages of the social, community and economic catalysts for the benefit of future generations, without taxation or other cost burdens on present generations.

Additionally, the commercial, mixed use, residential and ferry terminal buildings will be designed in accordance with best practice standards, including aiming to improve energy efficiency of the buildings and associated appliances. Building managers will be equipped with information packs for householders and commercial managers to become more economical in their use of energy (through behaviour, practices, technology and equipment), and to switch to energy sources with lower greenhouse gas emissions, where possible. Information on waste minimisation and efficiency of

resource use will be available during all stages of construction and operation of the Project. Finally, to the full extent practicable, the Proponent will aim to source sustainable/environmentally-friendly materials, – i.e. material that has low environmental impact through production, placing and maintenance.

d. The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making.

The Toondah Harbour PDA was created via an iterative, statutory process under the ED Act and subjected to consultation and design process that frontloaded State interests and incorporated RCC and community feedback into the development scheme.

The Proponent is now responsible for environment assessment under the EPBC Act, which has at its core biological diversity and ecological integrity. The environmental constraints have been highlighted by regulation, available desktop mapping and field assessment through this EIS which has provided detailed site assessment of all of the environmental values applicable to the Project footprint and surrounding areas (refer to Chapters 7-18).

There has been a high degree of interest from the community in the PDA, both from the perspective of the ecological and biodiversity impacts, as well as the social and economic outcomes. The Project has also been informed and challenged by open, transparent and independently peer reviewed science through the Independent Advisory Panel (IAP), convened by the International WaterCentre.

As a result of these inputs, two of the primary design principles for the master plan were solely related to maintaining the ecological sustainability, while the remainder serve to ensure ongoing limited impact and energy use and to maximise the ongoing amenity and social benefit. The following key sustainability-related design features have been included in the Project (refer to Chapter 1 for more detail):

- A net balance between dredging and reclamation volumes. Imported fill material requirements have been minimised with quarry sourced material generally only required rock armouring of seawalls and stabilisation of dredge material;
- Keeping the proposed widening and deepening of Fison Channel and the swing basin to the minimum required for safe navigation of multiple vehicle and passenger ferries to and from the harbour. Any reduction in channel widths or depths would impact on the safety and usability of the harbour. The extension will also align with the existing channel as much as possible to minimise dredged material volumes;
- Ensuring the design of the development does not impact on the Cassim Island and Nandeebie Claypan high tide roost sites. Design features to ensure impacts are avoided include separating the landform from Cassim Island and inclusion of a channel through the eastern arm of the development to disperse tidal flows and a minimum 250 m buffer between the mangroves fringing Cassim Island and any urban uses. The Nandeebie Claypan is separated from urban uses by more than 300 m;
- Separation of recreational boating and harbour uses to improve safety and direct recreational vessel movement away from the Cassim Island high tide roost site; and
- Incorporation of fish friendly structures in the design of the marine structures and revetment walls.

These are core considerations for the design of the dredging and reclamation works, key civil and transport infrastructure, and ultimately urban and port buildings. These design constraints have determined the limits to the port size and capacity, amount and location of reclamation, and the extent of parklands and the incorporation of public facilities, such as boat ramps. The design also serves to influence the recreational use of the surrounding coast and marine areas in favour of minimising disturbance.