Chapter 3
assessment approach

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Extract from Great Barrier Reef Coastal Zone Strategic Assessment terms of reference

2.1 Identification of MNES including OUV

The description must include the key terrestrial, coastal, and marine biodiversity and heritage values and supporting ecological processes considered critical to the functioning of MNES including OUV. This will be achieved in part through:

(a) an assessment of Queensland’s processes for identifying areas of MNES including OUV

(b) an assessment of Queensland’s processes to otherwise represent MNES including OUV as non-mapped descriptions of biophysical attributes.

The Strategic Assessment Report must also:

(c) provide sufficient information to allow an understanding of the connectivity between MNES including OUV

(f) describe the methodologies and data sources used for all of the above.

8 Independent review

The Program Report and Strategic Assessment Report will be the subject of independent review by a suitably qualified party, external to both the Queensland and Australian Governments.

9 Information sources

For information and data used in the assessment, the Strategic Assessment Report must state:

(a) the source of the information

(b) how recent the information is

(c) the reliability and limitations of the information.

Wherever possible information underpinning the strategic assessment will be made publicly available.
3. Assessment approach

- 1. Background
- 2. Social and economic context
- 3. Assessment approach
- 4. Condition & trend
- 5. Pressures
- 6. Projected condition
- 7. Program summary
- 8. Program effectiveness
- 9. Adaptive management
- 10. Recommended changes
3.1 Introduction

This chapter sets out the technical framework and methodologies used to identify MNES values in the GBR coastal zone as well as the general approach to the strategic assessment, the stakeholder input into its development, and the processes for scientific, peer and independent reviews.

The TOR setting out the requirements for this strategic assessment were finalised and released by the then Minister for Sustainability, Environment, Water, Population and Communities on 31 August 2012 (refer Appendix D). The TOR were finalised following a public consultation period between 18 February and 30 April 2012.

The following key principles have underpinned this strategic assessment:

1. Fulfil the TOR
2. Establish a system-wide, landscape scale understanding of the current extent, condition and trend for MNES based on the existing legacy and current activities and the pressures these create
3. Recognise impacts vary at different spatial and temporal scales
4. Utilise existing information where possible
5. Use information that is publicly available and peer reviewed
6. Include spatial presentations of risks and impacts wherever possible
7. Use demonstration cases to describe in more detail how the management systems identify, protect and manage MNES and OUV with reference to particular values, places or pressures
8. Choose these detailed demonstration cases based on clear and transparent criteria
9. Acknowledge and report confidence, uncertainties and gaps in information

3.2 The approach

3.2.1 Complex overlapping MNES

The comprehensive strategic assessment of the GBRWHA and adjacent coastal zone is the largest undertaken under the EPBC Act to date. The size and complexity of the GBR and adjacent coastal areas, and the fact that MNES within the strategic assessment area vary in scale from individual species to the entire GBRWHA, make it impossible to assess every impact on every value. The complexity means this strategic assessment differs from strategic assessments undertaken elsewhere.

Specifically, this report assesses the effectiveness of a set of planning, development and NRM frameworks to protect MNES, rather than examining the potential impact from specific, regional-scale activities, such as expansion of an urban development within a metropolitan area.

There is spatial overlap between many of the individual MNES in the coastal zone, as outlined in Figure 3.2.1. For example, the basis for listing the GBR as a National Heritage place is its World Heritage values and, as a result these two occupy the same geographical area.

Where overlaps occur this strategic assessment groups MNES within the GBR coastal zone. The National Heritage places are included within the GBRWHA and Wet Tropics WHA assessment; they were both included on the National Heritage List on 21 May 2007.

In addition, all of the MNES do not occur in isolation, they are interconnected. For example, the GBR coastal zone species habitats, regional ecosystems and ecological processes are the basis of the GBR and Wet Tropics world heritage listings as well as supporting its listed threatened and migratory species and TECs.

While focused on the GBR coastal zone, this report does consider activities in the broader GBR catchment that impact MNES in coastal and marine areas. The primary catchment issues are activities that generate poor water quality that impacts on downstream values. Of particular importance are the impacts of rural diffuse pollution on reef ecosystems such as corals and seagrass.
3.2.2 Multi-scale assessment

Ecosystems are highly differentiated in space and time, and their sound management requires careful local planning and action. At the same time, local scale assessments rarely take into account broader considerations, such that environmental systems and processes operate across wider, often global, scales and resources often transfer across regions. The Millennium Ecosystem Assessment (MEA) was a United Nations project designed to assess the consequences of ecosystem changes for human well-being. The project identified that multi-scale assessment would enable project findings to be of greater use across many levels of decision-making. This is highly relevant to the GBR coastal zone strategic assessment given the complexity and various scales of MNES considered.

A multi-scale assessment evaluates the scale dependence of various actions and policies. Often the beneficial impacts of a policy change at a national scale can obscure negative impacts at a local scale. Although differing impacts of change will always exist, more careful assessment of these scale-dependent impacts can enhance the net benefits of actions and policies.

The strategic assessment has a tiered or hierarchical approach, looking broadly at the existing pressures. This report is used to demonstrate effectiveness of the Program at the GBR coastal zone scale. Demonstration cases (and shorter case studies) are then used for specific locations or initiatives to demonstrate the effectiveness of the Program in protecting MNES at a regional and local scale.

Across the vastness of the GBR coastal zone, its differing ecosystems (marine, terrestrial, freshwater wetlands, lowlands and elevated areas, soil and climatic differences) and land use history, there is a large variation in the extent, condition and trend of all the MNES values.

This assessment considers MNES values on a habitat basis (for species), regional ecosystem basis for threatened ecological communities and a discrete spatial basis for the World Heritage and Ramsar areas. It is not possible to consider every species or ecological community individually. The Queensland Government regional ecosystem mapping forms the basis of many of the ecological protection mechanisms of the Program and informs the assessment for species habitat and ecological communities used here.

There is a clear difference between the northern (Cape York) and southern sections of the coastal zone, in relation to extent of development and the types of development pressures occurring. However, the north-south distinction has not been considered in the identification of MNES values, and assessment of their extent, condition and trend in chapter 4.

For the marine environment, this report relies heavily on the more qualitative statements of the MNES values extent, condition and trend. This information is drawn primarily from the Great Barrier Reef Outlook Report 2009 (the Outlook Report), the national State of the Environment (SoE) 2011, the Queensland State of the Environment Report 2011 (2011) the GBRMPA for the GBR marine area. Because the focus of the GBR region strategic assessment is on the marine environment, in the interests of avoiding duplication, there is less emphasis on the marine environment in this report.

There are a number of standard terms regularly used in this report which indicate a hierarchy in relation to drivers, activities and their resulting pressures and impacts on MNES. Figure 3.2.2 explains these terms.

3.2.3 Strategic approach

This strategic assessment looks systemically at the effectiveness of Queensland Government’s Program to manage impacts on MNES to ensure it identifies, assesses and manages impacts on MNES to the extent required by the EPBC Act. This provides an...
opportunity to ensure in the long-term that the Queensland Government’s planning and development system directs development to the most appropriate locations to minimise impacts on MNES and support sustainable development.

The Queensland Government’s Program applies an ‘avoid or mitigate and offset’ policy approach (see section 3.8) to achieve positive outcomes for managing impacts on MNES when considering future development. Programs and policies complement this by seeking to address legacy impacts arising from historical land clearing and ongoing land uses. This works to enhance MNES by rehabilitating degraded ecosystems or restoring cleared ecosystems. Figure 3.2 3 conceptualises the overall strategic assessment approach.

Assessment of the effectiveness of the Program at protecting and managing MNES has been appraised using demonstration cases. This is in alignment with the TOR for the strategic assessment.

Regional and value specific assessments are made by way of demonstration cases and shorter case studies. Together these examples demonstrate the effectiveness of the Program in protecting MNES at the strategic, regional and value specific scale.

The scale and complexity of the strategic assessment needs a logical sequence to show the identification and analysis of Program impacts. Figure 3.2 4 illustrates the steps followed in undertaking the strategic assessment, from establishing a strong foundation by being clear about the identification of values and pressures, to identifying the current state and trend of MNES, and how effective the Program is at protecting MNES. The assessment includes proposed improvements to the Program that are required to ensure negative trends in MNES values are reversed or stabilised. The structure of the strategic assessment report reflects this approach.


3.3 Identifying MNES

This report primarily focusses on the land component of the GBR coastal zone and only includes marine MNES where the MNES species also utilise terrestrial habitat. In general, the report uses two types of data spatially identify MNES values. Where there is a fixed boundary for a MNES, it is used. This applies to World and National Heritage areas, the GBR Marine Park, Commonwealth marine areas and Ramsar sites. Regional ecosystems (REs) and Australian and Queensland government species distribution data is used for identifying geographic areas of other MNES (threatened species, threatened ecological communities and migratory species).

3.3.1 Australian Government mapping

The Australian Government uses a predictive species and ecological communities distribution model. This model depicts where MNES species and ecological communities are known to occur, likely to occur or may occur. Queensland Government’s planning and development assessment framework adopts a mapping system that identifies where matters of national and state environmental significance are most likely to be located.

To ensure that spatial information is readily available to assist the identification of MNES, the Australian Government has developed a Protected Matters Search Tool (PMST). The PMST generates reports that help determine whether MNES or other matters protected by the EPBC Act have the potential to occur in an area of interest. The PMST for threatened species uses a predictive approach that returns results for species that are either ‘known’ or ‘likely’ or ‘may’ occur in the area.

The Australian Government’s species profile and threats database (SPRAT) provides information on what the species looks like, its population and distribution, habitat, movements, feeding, reproduction and taxonomic comments. The information has been compiled by summarising information from a range of sources and contributors.

Information on species distribution provided through this facility is indicative only and the Australian Government recommends seeking local knowledge and information where possible (http://www.environment.gov.au/epbc/pmst/).

This strategic assessment uses the Australian Government’s mapping to identify the geographic extent of MNES with declared boundaries and uses Queensland Government mapping to identify the geographic extent of the following MNES:

- threatened ecological communities (TECs)
- key threatened species
- key migratory bird species.
3.3.2 Queensland Government’s biodiversity mapping methodology

Assessing relative biodiversity significance plays a vital role in establishing conservation priorities. Assessing the value of an area is based on an extensive set of attributes such as relative size or condition, whether it is habitat for threatened species, or if it provides connectivity across the landscape. Analysing Queensland Government’s biodiversity and land use data through geographic information systems (GIS) generates a valuable tool to enable rapid identification and analysis of MNES across the GBR coastal zone.

Being able to identify environmental values is dependent on the extent, quality and availability of relevant data, such as species distribution or the extent of ecological communities. Fortunately, Queensland has some of the best quality and most extensive biodiversity data within Australia. From vegetation communities, species habitat and aquatic ecosystems, the natural environment is well covered, as is the ability to assess the extent to which humans have had, or are continuing to have an impact on our environment. This, in turn, helps support information used to develop strong policy and planning for protection and conservation of high value biodiversity.

Mapping will continue to be an important input into planning through the life of Queensland Government’s Program to assist in the avoidance of impacts where possible. Queensland Government is committed to working with the Australian Government to improve mapping to ensure accurate identification of all EPBC listed threatened species, ecological communities and listed migratory species relevant to Queensland.

3.3.2.1 Regional ecosystem mapping

Mapping and classification of terrestrial and some estuarine ecosystems that support MNES values in Queensland is based on the digital RE mapping undertaken by Queensland Government’s Queensland Herbarium. This is one of three Queensland Government foundation or primary datasets for assessing biodiversity values, the other two being the Queensland Wetlands Mapping and the Species Sightings Database (known as WildNet).

REs are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. The Queensland Herbarium completed RE surveying for more than 85 per cent of the state’s vegetation, generally at a scale of 1:100 000. However, in the coastal zone south of Cape York Peninsula, the scale of the RE mapping is approximately 1:50 000 with a minimum polygon (or RE mapping unit) area of one hectare. This base mapping is revised using updated remotely sensed data approximately every three years.

However, there is usually a lag between when the updated RE mapping is released by the Herbarium and its availability. This mapping includes both remnant and non-remnant vegetation for both woody and non-woody REs. The surveying and mapping of vegetation communities and REs in Queensland provides information for regional NRM groups, non-government organisations, local, state and national governments and private industry for planning and management purposes.

The Queensland Herbarium assigns one of three conservation classes to remnant REs based on the remaining extent of an RE relative to its pre-clearing extent. The classes are:

- ‘endangered’ RE (less than 10 per cent of the pre-clearing extent remains, or there is between 10 to 30 per cent of the pre-clearing extent remaining but in total less than 10 000 hectares remains)
- ‘of concern’ REs (between 10 per cent and 30 per cent of the pre-clearing extent remains)
- ‘least concern’ (more than 30 per cent of the pre-clearing extent remains).

TECs, one of the MNES categories, are associated with groups of REs and so can be accurately mapped using RE data. Species habitat maps with a reasonable degree of accuracy as it generally equates with REs. However, the RE – habitat relationship is not as strong as the RE – TEC relationship. The classification of an RE, together with information about land use where it is located (such as a grazing area or conservation area) is also used to assess the expected condition of these areas. The analysis of the pre-clearing extent of REs changes over time, particularly since general prohibition of broadscale clearing for agriculture in Queensland 2006, and can provide an indication of trend for MNES values.

3.3.2.2 Queensland Wetlands Program

Queensland’s wetlands have been mapped digitally by building on existing information, including water body mapping derived from satellite imagery, mapping of wetland type REs and a springs database. The Queensland and Australian governments jointly fund the Queensland Wetlands Program (QWP) which produced the mapping. The QWP published an updated version of the Queensland Wetlands Map in February 2012.

The QWP classifies wetlands according to a range of criteria, including the type of ecological system (riverine, estuarine, etc.), their degree of water permanency, salinity and degree of modification. The result is a consistent wetland map at a scale of 1:100 000, with finer detail in some parts of Queensland where appropriate mapping data exists (mainly coastal regions). This includes in the coastal zone south of Cape York Peninsula, where
the scale of the wetlands mapping is approximately 1:50 000 with a minimum polygon area (or wetland mapping unit) of one hectare. Queensland Government’s wetlands mapping incorporates wetland areas within Ramsar sites, as well as those within areas in Directory of Important Wetlands in Australia.

QWP also uses aerial photography to classify wetlands by the degree of hydrological and ecological modification observed. Modification can include bunds, conversion of a natural wetland to a dammed body of water, drains or creating artificial wetlands. This data is consistent across Queensland and is an invaluable tool for determining wetland habitat condition.

QWP wetland mapping can be used for determining habitat for MNES species, including migratory breeding and roosting sites, as well as identifying aquatic habitats within Ramsar sites and WHAs. QWP wetland ecosystems can then be analysed for the level of modification of habitat and current protection status. Reviewing previous versions of QWP wetlands with current mapping to evaluate the changing modification of natural aquatic ecosystems is useful for identifying MNES trends.

3.3.2.3 Species sightings data

Sightings records for plants and animals, including MNES such as migratory species and threatened species, are included in the Queensland Government’s wildlife database, WildNet. The database stores a range of information including survey data, wildlife sightings, species lists, species descriptions and species status. The data can range from a number of sources, from expert surveys, historical museum data, to amateur enthusiasts and the public. The data repository, CoreVEG, managed by the Queensland Herbarium, is the source of most of the flora sightings records within WildNet.

This species data varies in quantity and quality between individual species. All sightings are verified; however, except for funded expert species surveys, they are mainly distributed to areas of human-wildlife interaction (e.g. urban areas, main highways). Many rare or reclusive species that exist within unpopulated areas have very few or no sightings records available. Also, the sightings may have been from past records where species habitat has now diminished and no longer exists, due to clearance for example. Data may also exist for species that, due to their nature, are free-roaming and utilise a variety of habitats (e.g. highly mobile species such as the red goshawk).

Queensland Government incorporates species data as well as peer reviewed habitat modelling into essential habitat mapping for threatened species.

3.3.2.4 Essential habitat mapping

The three primary data sets (REs, Wetlands and Species Sightings) provide the basis for further analysis and assessment, generally using GIS supported methodologies, to establish derived products fit for specific purposes. The species ‘essential habitat’ mapping is one of these. The Queensland Government uses three methods to map essential habitat, being vegetation communities in which threatened species have been known to occur. Peer reviewed habitat models provide the best accuracy and reliability; where species habitats are known to equate with specific REs, RE mapping is combined with species sightings; where other methods are not available buffered species sightings are used.

The VM Act protects essential habitat to prevent loss of biodiversity. Queensland Government assesses applications to clear vegetation based on the presence of essential habitat. When essential habitat mapping is assessed for vegetation clearing purposes the mapping can be further evaluated to determine whether it contains essential habitat factors that confirm it is suitable for a certain species. These habitat factors include, but are not limited to:

- Vegetation – the species or types of vegetation that the species is associated with
- RE – the regional ecosystem(s) with which the species is most commonly associated
- land zone – the underlying geology associated with a regional ecosystem
- altitude – the range of altitudes at which the species is found
- soils – the type of soil on which a species is most commonly found
- position in landscape – a precise description of the landscape features the species is commonly associated with (e.g. creek bank, levees, lower slopes, hillsides and ridges).

At least three essential habitat factors are listed for each species, of which one or more may be categorised as mandatory. Peer-reviewed modelling is the most accurate method of habitat mapping as it has been determined specifically by experts with key knowledge of the species’ foraging, feeding, roosting and breeding habits. Habitat modelling is undertaken for individual species, generally species that are of iconic value or are key species as they share habitat with many other significant species. The mapping process includes peer review by other experts and refinement to where the species exists in the real-world environment. Modelled habitat for one species generally incorporates habitats for other species, for which data are often poor.
For example, the southern population of cassowary (Casuarius casuarius) occurs within the Wet Tropics in dense vine rainforests extending to the coast at Mission Beach and Daintree localities. The distribution of the cassowary is well known with peer-reviewed spatially defined areas for primary and secondary habitat as well as habitat for rehabilitation. The distribution covers over 700,000 hectares of a broad range of habitats and vegetation communities. At least 69 EPBC Act threatened species have been sighted within the cassowary habitat.

In the absence of either modelled habitat or habitat identified using the ‘habitat factors’ method, species habitat mapping is based on sightings data and a buffer of remnant vegetation surrounding it. To ensure greater accuracy only species sightings reliably recorded and sighted after 1950 (for flora) and 1970 (for fauna) are used. For species considered to be highly mobile, only known breeding and roosting sites are used.

### 3.3.2.5 Queensland Land Use Mapping Project (QLUMP)

While not providing a basis for determining the geographic extent of MNES or other biodiversity values, land use mapping enhances our understanding of the likely condition and trend of natural values. Land use and land management practices have a profound impact on Queensland’s natural resources, the environment and agricultural production. The availability of consistent and reliable spatial information on land uses is critical for sustainable natural resource management. Queensland Government provides excellent and consistent land use and cover mapping through QLUMP.

QLUMP maps incorporate patterns of land use and land use change across Queensland in accordance with the Australian Land Use and Management (ALUM) classification. Governments, the private sector, research agencies and community groups use the QLUMP data for natural resource assessment, monitoring and planning.

Land use and land cover information are both included within the QLUMP product. Land use describes the land is used for (e.g. grazing, irrigated cropping, mining, residential or conservation). Land cover describes the physical surface of the earth, (e.g. forest, pasture, water or urban).

The QLUMP mapping provides valuable trend information on human impacts in the last 10 years. To assess MNES condition, RE and wetlands mapping, together with species habitat mapping overlaid with QLUMP mapping is used. This approach is consistent with the Vegetation Assets, States, and Transitions (VAST) framework used for national vegetation condition assessment.

### 3.4 Methodology for selecting key MNES values

An objective of the GBR coastal zone strategic assessment is to assess the status of MNES species and TECs within the area. The large number of species and limited species data make it difficult to assess accurately the condition of each MNES species and TEC. A process to select a representative group, or ‘key’ MNES species and TECs, is required to best illustrate the extent, condition and trend of MNES species and TECs within the GBR coastal zone.

Queensland Government used the PMST to generate lists of threatened species, migratory species and TECs predicted to occur in the GBR coastal zone. The list includes 175 nationally threatened species, 81 migratory species and seven TECs (Appendix E and F).

Queensland Government refined the lists using species sightings records, habitat models and regional ecosystem mapping. The selected MNES species and ecological communities have been subject to an assessment of extent, condition and trend in chapter 4. From these lists the Queensland Government created a representative list for each of the MNES groupings and assessed their condition and trend based on habitat in the GBR coastal zone.

Identification of the key MNES species and ecological communities involved applying the following three processes:

#### Selection of threatened species

1. The Australian Government’s mapping data (PMST) was used to identify EPBC threatened species predicted to occur within the GBR coastal zone – this step generated a list of 175 threatened species.
2. Thirteen marine species were removed as these are being addressed in the GBR Region Strategic Assessment. These include: MNES threatened species listed as ‘marine’ or ‘marine-overfly’ under the EPBC Act; Cetaceans; Sharks, and; Turtles – 162 species remained after this step was completed.
3. One hundred and twelve terrestrial species in the GBR region which are not regularly triggered for development assessments under the EPBC Act were removed. These species, though still regarded as important, were removed as their habitats are most likely not as threatened by development, or do not come in contact with development as much as species that are commonly triggered – this resulted in a list of 50 species.
4. Thirty-seven species were removed because species habitat mapping, sightings data and literature review (including the...
Australian Government’s habitat descriptions) showed they did not occur, or predominantly did not occur in the GBR coastal zone – This resulted in a list of 13 species.

5. Two species, the nothern quoll (Dasyurus hallucatus) and the spectacled flying fox (Pteropus conspicillatus) had no recent sightings or modelled habitat in the coastal zone and so were excluded.

6. This report assesses a final list of 11 ‘key species’.

Selection of TECs
A similar process was used to identify TECs predominantly located in the GBR coastal zone:

1. The Australian Government’s mapping data (PMST) was used to identify TECs predicted to occur within the GBR coastal zone were selected – this identified seven TECs.

2. The equivalent REs for each TEC were identified and mapped against the GBR coastal zone.

3. TECs that have most of their occurrence outside of the GBR coastal zone were removed.

4. Two ‘key TECs’ have the majority of their distribution in the GBR coastal zone. Four of the five excluded TECs had less than 1 per cent of their extent in the GBR coastal zone while the fifth had less than 5 per cent of its extent in the GBR coastal zone.

Selection of migratory species
The following process identified migratory species that predominantly used the GBR coastal zone:

1. Migratory species predicted by the PMST mapping system to occur within the GBR coastal zone were selected.

2. Migratory species listed as ‘marine’ under the EPBC Act (cetaceans, sharks and turtles) were removed as these are assessed in the GBR Region Strategic Assessment.

3. A migratory species shortlist was developed identifying regionally important species and those that have commonly triggered the EPBC Act for past or current proposals in the GBR coastal zone. This refined the list to migratory birds.

4. The PMST mapping system was used to identify known breeding and roosting sites of ‘key migratory birds’ within the GBR coastal zone.

With the selection of known breeding and roosting sites of migratory bird species in the GBR coastal zone, the list of migratory species was refined from 81 to 38 species. Queensland Government assessed all migratory species habitat together for condition and trend using the same method for threatened species and TECs. Migratory habitats for the degree of modification of wetland habitats using QWP wetland mapping were assessed.

Key MNES threatened species, Key TECs and Key migratory bird species
Table 3.5.1 and Table 3.5.2 list the key threatened species, key TECs and key migratory bird species. Analyses of extent, condition and trend of the key MNES species and TECs are included in chapter 4.
### Table 3.5-1 Key threatened species and ecological communities in the GBR coastal zone

<table>
<thead>
<tr>
<th>MNES</th>
<th>EPBC Status</th>
<th>NC Act Status</th>
<th>NRM Region</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fauna</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bare-rumped sheathtail bat <em>(Saccolaimus saccolaimus nudicliniatus)</em></td>
<td>Critically Endangered</td>
<td>Endangered</td>
<td>Cape York</td>
</tr>
<tr>
<td>Mahogany glider <em>(Petaurus gracilis)</em></td>
<td>Endangered</td>
<td>Endangered</td>
<td>Wet Tropics</td>
</tr>
<tr>
<td>Proserpine rock wallaby <em>(Petrogale persephone)</em></td>
<td>Endangered</td>
<td>Endangered</td>
<td>Mackay Whitsunday</td>
</tr>
<tr>
<td>False water rat <em>(Xeromys myoides)</em></td>
<td>Vulnerable</td>
<td>Vulnerable</td>
<td>Mackay Whitsunday</td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yellow chat <em>(Ephianura crocea)</em></td>
<td>Critically Endangered</td>
<td>Endangered</td>
<td>Fitzroy</td>
</tr>
<tr>
<td>Southern cassowary <em>(Casuarius casuarius johnsonii)</em> (northern and southern population)</td>
<td>Endangered</td>
<td>Endangered</td>
<td>North Cape York South Wet Tropics Burdekin MacKay Whitsunday</td>
</tr>
<tr>
<td><strong>Flora</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Flowering plants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian arenga palm <em>(Arenga australasica)</em></td>
<td>Vulnerable</td>
<td>Vulnerable</td>
<td>Cape York Wet Tropics</td>
</tr>
<tr>
<td>Cardwell bearded orchid <em>(Calochilus psednus)</em></td>
<td>Endangered</td>
<td>Endangered</td>
<td>Cape York Wet Tropics</td>
</tr>
<tr>
<td>Cooktown orchid <em>(Dendrobium bigibbum)</em></td>
<td>Vulnerable</td>
<td>Vulnerable</td>
<td>Cape York Wet Tropics</td>
</tr>
<tr>
<td>Quassia bidwillii</td>
<td>Vulnerable</td>
<td>Vulnerable</td>
<td>Mackay Whitsunday Fitzroy Burdekin Burnett Mary</td>
</tr>
<tr>
<td><strong>Cycads</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycas silvestris</td>
<td>Vulnerable</td>
<td>Vulnerable</td>
<td>Cape York</td>
</tr>
<tr>
<td><strong>TEC</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broad leaf tea-tree <em>(Melaleuca vindiflora)</em> woodlands in high rainfall coastal north Queensland</td>
<td>Endangered</td>
<td></td>
<td>Cape York Peninsula; Far North Queensland, North Queensland; Mackay, Isaac and Whitsunday; Central Queensland</td>
</tr>
<tr>
<td>Littoral Rainforest and Coastal Vine Thickets of Eastern Australia</td>
<td>Critically Endangered</td>
<td></td>
<td>Cape York Peninsula; Far North Queensland, North Queensland; Mackay, Isaac and Whitsunday; Central Queensland</td>
</tr>
</tbody>
</table>
Table 3.5-2 Key Migratory MNES that are represented by known breeding and roosting sites

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actitis hypoleucos</td>
<td>Common Sandpiper</td>
</tr>
<tr>
<td>Anous stolidus</td>
<td>Common Noddy</td>
</tr>
<tr>
<td>Arenaria interpres</td>
<td>Ruddy Turnstone</td>
</tr>
<tr>
<td>Calidris acuminata</td>
<td>Sharp-tailed Sandpiper</td>
</tr>
<tr>
<td>Calidris alba</td>
<td>Sanderling</td>
</tr>
<tr>
<td>Calidris canutus</td>
<td>Red Knot, Knot</td>
</tr>
<tr>
<td>Calidris ferruginea</td>
<td>Curlew Sandpiper</td>
</tr>
<tr>
<td>Calidris melanotos</td>
<td>Pectoral Sandpiper</td>
</tr>
<tr>
<td>Calidris ruficollis</td>
<td>Red-necked Stint</td>
</tr>
<tr>
<td>Calidris tenuirostris</td>
<td>Great Knot</td>
</tr>
<tr>
<td>Charadrius bicinctus</td>
<td>Double-banded Plover</td>
</tr>
<tr>
<td>Charadrius leschenaultii</td>
<td>Greater Sand Plover, Large Sand Plover</td>
</tr>
<tr>
<td>Charadrius mongolus</td>
<td>Lesser Sand Plover, Mongolian Plover</td>
</tr>
<tr>
<td>Charadrius veredus</td>
<td>Oriental Plover, Oriental Dotterel</td>
</tr>
<tr>
<td>Fregata ariel</td>
<td>Lesser Frigatebird, Least Frigatebird</td>
</tr>
<tr>
<td>Fregata minor</td>
<td>Great Frigatebird, Greater Frigatebird</td>
</tr>
<tr>
<td>Gallinago hardwickii</td>
<td>Latham's Snipe, Japanese Snipe</td>
</tr>
<tr>
<td>Heteroscelus brevipes</td>
<td>Grey-tailed Tattler</td>
</tr>
<tr>
<td>Heteroscelus incanus</td>
<td>Wandering Tattler</td>
</tr>
<tr>
<td>Limicola falcinellus</td>
<td>Broad-billed Sandpiper</td>
</tr>
<tr>
<td>Limosa lapponica</td>
<td>Bar-tailed Godwit</td>
</tr>
<tr>
<td>Limosa limosa</td>
<td>Black-tailed Godwit</td>
</tr>
<tr>
<td>Numenius madagascariensis</td>
<td>Eastern Curlew</td>
</tr>
<tr>
<td>Numenius minutus</td>
<td>Little Curlew, Little Whimbrel</td>
</tr>
<tr>
<td>Numenius phaeopus</td>
<td>Whimbrel</td>
</tr>
<tr>
<td>Pluvialis fulva</td>
<td>Pacific Golden Plover</td>
</tr>
<tr>
<td>Pluvialis squatarola</td>
<td>Grey Plover</td>
</tr>
<tr>
<td>Puffinus pacificus</td>
<td>Wedge-tailed Shearwater</td>
</tr>
<tr>
<td>Sterna anaethetus</td>
<td>Bridled Tern</td>
</tr>
<tr>
<td>Sterna bengalensis</td>
<td>Lesser Crested Tern</td>
</tr>
<tr>
<td>Sterna caspia</td>
<td>Caspian Tern</td>
</tr>
<tr>
<td>Sterna sumatrana</td>
<td>Black-naped Tern</td>
</tr>
<tr>
<td>Sula dactylatra</td>
<td>Masked Booby</td>
</tr>
<tr>
<td>Sula leucogaster</td>
<td>Brown Booby</td>
</tr>
<tr>
<td>Sula sula</td>
<td>Red-footed Booby</td>
</tr>
<tr>
<td>Tringa glareola</td>
<td>Wood Sandpiper</td>
</tr>
<tr>
<td>Tringa stagnatilis</td>
<td>Marsh Sandpiper, Little Greenshank</td>
</tr>
<tr>
<td>Xenus cinereus</td>
<td>Terek Sandpiper</td>
</tr>
</tbody>
</table>

3.4.1 Methodology for identifying key habitat

The majority of habitats for key TECs, threatened species and migratory species in the GBR coastal zone have been mapped based on REs associated with MNES sightings or habitat models. Cleared and non-vegetated areas (e.g. water) were not included as only vegetated RE communities were considered MNES habitat. As the habitat is based on remnant REs, non-remnant areas were not included in current version of RE mapping.

The mapped habitat for key migratory species is based solely on REs and wetlands in which sightings occurred, and identified breeding and roosting sites.

The pre-clearing and current extent of identified key habitat area was determined; this provided a pre and post development area of habitat for each TEC and species assessed. This method for habitat identification was preferred over modelled habitat as the extent of some threatened species is based on current habitat extent only (usually derived from recent RE mapping), meaning pre-cleared analysis cannot be determined.

SPRAT information listing REs identified the habitat of the key TECs. The SPRAT TEC table translates TECs descriptions into REs and lists them for each TEC. The same REs in the SPRAT TEC table were selected from the pre-clearing and current extent versions of the RE mapping and the area of RE for each was calculated. This showed the extent of habitat clearance since European settlement. These associated REs became the TEC habitat for analysis (Figure 3.5.2).

The REs’ numeric and ecosystem description for the broad leaf tea-tree (Melaleuca viridiflora) woodlands in high rainfall coastal north Queensland community:

- 7.3.8a Melaleuca viridiflora open-forest to open-woodland, on poorly drained alluvial plains
- 7.3.8b Melaleuca viridiflora open-forest to open-woodland with eucalypt emergents (or sparse eucalypt overstorey) of species such as Corymbia clarksoniana, Eucalyptus platypylla, Lophostemon suaveolens and E. drepanophylla on poorly drained alluvial plains
- 7.3.8c Melaleuca viridiflora and Lophostemon suaveolens
open forest to woodland, on poorly drained alluvial plains

- 7.3.8d Melaleuca viridiflora, Lophostemon suaveolens and Allocasuarina littoralis open-shrubland, on poorly drained alluvial plains
- 7.5.4g Melaleuca viridiflora woodland on laterite
- 8.3.2 Melaleuca viridiflora woodland on seasonally inundated alluvial plains with impeded drainage
- 8.5.2a Melaleuca viridiflora +/- Allocasuarina luehmannii woodland on Tertiary sand plains
- 8.5.2c Melaleuca viridiflora and M. nervosa woodland on Tertiary sand plains
- 8.5.6 Melaleuca viridiflora +/- Allocasuarina littoralis woodland on Tertiary sand plains

The REs that currently equate to the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia community are:

- 3.2.1 Evergreen notophyll vine forest on coastal dunes and beach ridges
- 3.2.11 Low microphyll vine forest. Occurs on coastal dunes and beach ridges
- 3.2.12 Araucarian microphyll vine forest on coastal dunefields and beach ridges
- 3.2.13 Evergreen notophyll vine forest on beach ridges on the east coast
- 3.2.28 Evergreen notophyll vine forest on beach ridges on coral atolls, shingle cays and sand cays
- 3.2.29 Pisonia grandis low closed forest. Restricted to a few scattered sand cays

Figure 3.5.2 An example of determining key MNES TEC habitat (associated REs)
3.2.31 Premna serratifolia closed scrub. Restricted to coral atolls, shingle cays and sand cays

3.12.20 Evergreen notophyll vine forest dominated by Welchiodendron longivalve on headlands

7.2.1a-i Mesophyll vine forest on beach ridges and sand plains of beach origin

7.2.2a-h Notophyll to microphyll vine forest on beach ridges and sand plains of beach origin

7.2.5a Mesophyll/notophyll vine forest of Syzygium forte subsp. forte on beach ridges and sand plains of beach origin

7.2.6b Mosaic of clumps of notophyll vine forest, sclerophyll spp. shrublands and open woodlands, and bare sand blows, on aeolian dunes

7.11.3b Semi-deciduous mesophyll vine forest on metamorphics, of the moist and dry foothills and lowlands

7.12.11d Simple notophyll vine forest and notophyll semi-evergreen vine forest of rocky areas and talus, of moist granite and rhyolite foothills and uplands

8.2.2 Microphyll vine forest on coastal dunes

12.2.2 Microphyll/notophyll vine forest on beach ridges

The identification of habitats for key threatened species used a similar process to identifying TEC habitats, except the associated REs were derived from sighting areas and modelled habitat and then extended to the entire GBR coastal zone. Key species sighting areas are sightings records in the GBR coastal zone surrounded by a 1000 metre buffer to allow for the range of individual animals.

Key species modelled species habitat is the area determined by experts as a species primary habitat and included within essential habitat. Essential habitat is an area of vegetation in which an endangered, vulnerable, rare or near threatened species have been known to occur. Essential habitat was identified by using habitat factors, including, but not limited to:

- Vegetation – the species or types of vegetation with which the species is associated
- RE – the REs with which the species is most commonly associated
- land zone – the underlying geology associated with a RE
- altitude – the range of altitudes at which the species is found
- soils – the type of soil on which a species is most commonly found

Associating REs with threatened species to identify habitat was the method preferred over including only REs that are within a sighting area. The process of identifying the habitat for the threatened species involved mapping the species sighting record and buffer area and modelled habitat over the pre-cleared RE mapping. The REs that intersected the species sighting record and modelled habitat were selected and the area calculated (see Figure 3.5 3). The same REs were then selected in the current extent RE mapping and the area calculated.

A similar technique was used to identify migratory species habitat, with additions (such as wetlands, which may be devoid of vegetation). Only migratory bird species were considered as the majority of the other migratory species are marine. The key migratory species habitat was defined by known breeding and roosting sites in the GBR coastal zone. Key migratory species habitat was also analysed against the QWP. The habitat type and modifications for all wetland types that crossed the key MNES migratory habitat were investigated. All known breeding and roosting sites for migratory species in the GBR coastal zone were analysed together and only REs that crossed the key migratory species habitat were included in the analysis (see Figure 3.5 4).
3.5 Extent, condition and trend

Assessments of the extent, condition (or state) and trend of MNES are based primarily on the associated REs (for TECs), species habitat (for listed threatened species) or defined boundaries for specified areas (such as World Heritage and Ramsar areas).

3.5.1 Extent

The assessment of extent is based on an assessment of REs which establishes the conservation significance of REs based on area of their pre-clearing extent remaining. This is robust data and temporal snapshots dating from the early 1990s can be used to track changes in RE extent.

Similarly, the extent of habitat for listed threatened or migratory species can be tracked as this is generally tied to sightings data linked to RE data. The extent of the specified areas (WHA and Ramsar sites) is the simplest measure given the firm cadastral boundaries these areas have.

3.5.2 Condition

This strategic assessment report uses grading statements to standardise the assessments. There are four grades available for each assessment. For example, the condition of each MNES is graded by rating its condition against a standard set of grading statements. The most conservative grading statement was applied overall for each assessment.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Equivalent term in IUCN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good condition</td>
<td>All elements necessary to maintain listing of an area are essentially intact, and their overall condition is stable or improving. Available evidence indicates only minor, if any, disturbance to ecological (and OUV where applicable) values</td>
<td>Good</td>
</tr>
<tr>
<td>Good condition</td>
<td>Some loss or alteration of the elements necessary to maintain listing has occurred, but their overall condition is not causing persistent or substantial effects on ecological/OUV values</td>
<td>Good with concerns</td>
</tr>
<tr>
<td>Poor condition</td>
<td>Loss or alteration of many elements necessary to maintain listing has occurred, which is leading to a significant reduction in ecological/OUV values</td>
<td>Significant concerns</td>
</tr>
<tr>
<td>Very poor condition</td>
<td>Loss or alteration of a majority of elements necessary to listing has occurred and has caused a major loss of the ecological/OUV value</td>
<td>Critical</td>
</tr>
</tbody>
</table>

Source: IUCN system for assessing Natural World Heritage sites
The grading statements for specific MNES areas in the coastal zone (including the GBRWHA) are consistent with those in the GBR regional strategic assessment (Table 3.5-1). The supporting evidence for those grading statements is contained in the GBR regional strategic assessment report.

Some MNES have relatively detailed information available, such as for Ramsar areas where ecological character descriptions (ECDs) have been completed (refer to the Bowling Green Bay demonstration case) or the Wet Tropics WHA where a management plan and conservation strategy have been prepared (refer to the Wet Tropics WHA demonstration case). However, there is limited direct information about the condition of most environments containing MNES values (particularly outside protected areas).

Data relating to the condition of TECs and the habitat for listed threatened or migratory species varies considerably. Unfortunately, no assessment technique is available to measure the condition of broadscale areas. As a result an assessment of the condition of MNES, TECs, threatened and migratory species habitat areas generally relies on a combination of indirect measures, particularly conservation status and land use classification as a proxy (Table 3.5-2).

Land use, specifically the current or potential intensity of that use, is considered to be a reasonable proxy for condition and long-term viability. For example, at the extremes, land in conservation areas is expected to remain intact and well managed for conservation outcomes, whereas an area of MNES located in an urban area is more likely to be managed to enhance its development potential. Land use has been categorised as conservation, minimal use, moderate use and intensive use (see Table 3.5-3.)

<table>
<thead>
<tr>
<th>Table 3.5-2 Threatened and migratory species</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Very good condition</strong></td>
</tr>
<tr>
<td><strong>Good condition</strong></td>
</tr>
<tr>
<td><strong>Poor condition</strong></td>
</tr>
<tr>
<td><strong>Very poor condition</strong></td>
</tr>
</tbody>
</table>

Source: Australia SoE, adapted from Outlook Report 4

<table>
<thead>
<tr>
<th>Table 3.5-3 Threatened and migratory species habitat and threatened ecological communities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Very good condition</strong></td>
</tr>
<tr>
<td><strong>Good condition</strong></td>
</tr>
<tr>
<td><strong>Poor condition</strong></td>
</tr>
<tr>
<td><strong>Very poor condition</strong></td>
</tr>
</tbody>
</table>

Source: DEHP (2013)
Queensland Government manages conservation areas such as national parks, other protected areas under the NC Act, fish habitat reserves and high protection marine park zones areas primarily or substantially in a way to protect and enhance their natural values. These areas essentially remain intact and human activities result in minimal impacts. Additionally, it is assumed that land management practices in these areas ensure pest and fire management is undertaken with a view to protecting or enhancing natural values. On this basis land used for these purposes is assumed to be in very good condition and the trend is stable.

Minimal use areas are natural areas used for low impact activities. These areas include state forests and military training areas. In these areas, biodiversity values are often managed as well as conservation areas, but the intensity of use is likely to lead to a greater level of impact. In these areas pest and fire management is undertaken with a view to protecting assets as well as natural values. It is assumed that ‘minimal use’ areas are in good condition and the trend is stable.

In areas classified as containing moderate land use, such as grazing or agriculture, human activities may not be very intense, but because they are not managed primarily to protect biodiversity values it has been assumed that the condition of these areas is lower and will trend down over time. These uses pose greater threats, such as the loss of native grasses through grazing, erosion due to stock herding, limited management of environmental pests, and fire regimes suited to productive rather than ecological purposes. The condition of habitat is considered poorer in these areas because of the frequency of human activities in these areas and the susceptibility to further degradation. It is assumed that ‘moderate use’ areas are in poor condition and the trend is deteriorating.

Activities within an urban footprint, including port and industrial areas, are considered intensive uses. While MNES areas may remain in urban areas, they are more likely to be subject to a high level of pressures. One of the greatest threats to habitat condition within the urban footprint is fragmentation and expected loss of biodiversity. Some of these areas may remain intact but be very species poor due to having less interaction with similar habitats and loss of species from crossing between fragments (e.g. car strikes, domestic predators). Additionally, it is less likely that management will address pest and fire issues from an ecological perspective. In the long-term these areas are either cleared for development, or retained as low biodiversity value parklands or recreation areas for residents.

The condition of ecosystem processes was also determined in this assessment and the grading statements are provided in Table 3.5-4.

### 3.5.3 Trend and confidence

Queensland Government has also provided an assessment of the trend and the level of confidence for each grading statement

<table>
<thead>
<tr>
<th>Table 3.5-5</th>
<th>Trend and confidence grading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trend</strong></td>
<td><strong>Confidence</strong></td>
</tr>
<tr>
<td>Improving</td>
<td>Adequate high-quality evidence and high level of consensus</td>
</tr>
<tr>
<td>Deteriorating</td>
<td>Limited evidence or limited consensus</td>
</tr>
<tr>
<td>Stable</td>
<td>Evidence and consensus too low to make an assessment</td>
</tr>
</tbody>
</table>

Source: Australia SoE, adapted from *Outlook Report*
(Table 3.5.5). Trend and confidence indicators were adapted from those used for the Australian State of the Environment Report. The trend assessment uses historical information to identify the recent trend. For key TECs and MNES species this relates to a combination of extent and condition. For the majority of species habitat in conservation areas and minimal use areas trend gradings are stable, and for moderate land use and intensive land use areas trend gradings are deteriorating.

Given the limitations of data used to establish MNES extent, and the proxy approach used to establish ‘condition’, trend data is indicative and likely to be unreliable at a broad scale. It is therefore important to ascribe an indicator of the level of confidence we have in the grading statements provided. The confidence indicator shows the strength of the evidence, with high confidence indicating adequate high-quality data and low confidence showing there was only limited data or consensus to make an assessment. If there was too little data to provide a score this information gap is indicated.22 This strategic assessment indicates trend as either ‘improving’, ‘stable’ or ‘deteriorating’. Each assessment applies the most conservative grading of trend and confidence.

### 3.6 Pressures and impacts

Pressures and impacts may be positive or negative. Applying a consistent grading system for individual impacts provides a basis for determining overall cumulative impacts from multiple activities (see Table 3.6.1).

<table>
<thead>
<tr>
<th>Grading</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive effect</td>
<td>There are positive effects of the impact that are more significant than any negative effects</td>
</tr>
<tr>
<td>No effect</td>
<td>No interaction or the interaction is so insignificant that it can be considered negligible</td>
</tr>
<tr>
<td>Very low effect</td>
<td>Any effects attributable to the impact are minor or localised, with no observable effects on the values</td>
</tr>
<tr>
<td>Low effect</td>
<td>The effects of the impact are observable in some locations or to some species, but only to the extent that limited additional intervention would be required to maintain the values</td>
</tr>
<tr>
<td>High effect</td>
<td>The effects of the impact are obvious in many locations or for many species to the extent that significant additional intervention would be required to maintain the values</td>
</tr>
<tr>
<td>Very high effect</td>
<td>The effects of the impact are widespread, to the extent that the values are severely compromised</td>
</tr>
</tbody>
</table>

For the purposes of the strategic assessment, cumulative impacts are the combined and incremental environmental effects from existing and proposed pressures on the GBR coastal zone and subsequently on the GBR, the interaction between those impacts, and the accumulation of past, present and potential future activities.

The extent and diverse coastal environment of the GBR presents many challenges in assessing the cumulative impacts within the 2300 kilometre long GBR coastal zone.

Queensland Government collects and interprets information regarding the impacts on the GBR, including MNES, at a broad scale. More detailed analysis on a regional and local scale provides an indicator of the drivers of cumulative impacts and progress with regard to reversing the decline in water quality and terrestrial habitats in the GBR coastal zone. Queensland Government bases these assessments on accurate quantitative data on vegetation and wetland extent, and species numbers and distribution that enable measurement of the state and trend of MNES.

A number of mechanisms are already in place to assess and monitor cumulative impacts, which range in scale and provide different functions to inform management. This strategic assessment report discusses cumulative impacts and the management of cumulative impacts in sections 5.5 and 5.6.
3.7 Program effectiveness

The ‘avoid, mitigate, offset’ approach is widely used to ensure no significant impacts on the environment result from future development decisions. The Queensland Government’s Program uses this approach to achieve positive outcomes for MNES, as outlined in Figure 3.7.1. Additionally the program contains components aimed at enhancing MNES.

3.7.1 Avoid

The first priority is avoiding impacts on MNES. The Queensland Government’s Program endeavours to avoid impacting MNES by:
- planning within areas designated for development
- locating development away from MNES areas
- constructing developments outside sensitive migration periods
- project design
- extending and effectively managing Queensland’s protected area estate.

3.7.2 Mitigate

Where development cannot avoid MNES, the next priority is to ensure impacts are minimised as far as possible through the design and construction of the project, through development of management plans or by timing of operations. Mitigation refers to measures applied to reduce the level of impact from a proposed development during its implementation. This primarily occurs through placing appropriate conditions on individual development approvals during the development assessment process. The Queensland Government has produced a range of plans, policies, programs and guides to reduce the level of impact from development.

3.7.3 Offset

Where impacts cannot be reasonably avoided and impacts are minimised as much as practicable, residual impacts must be offset to ensure that the value which is being impacted is no worse off. Environmental offsets are conservation activities which compensate environment harm caused by development when it cannot be avoided or mitigated. Offsets can take the form of positive management interventions such as restoration of degraded habitat, arrested degradation or averted risk, protecting areas where there is imminent or projected loss of biodiversity.

Offsetting occurs through offsetting policies designed by the Queensland Government to counterbalance any residual loss of MNES values that cannot be avoided or mitigated. The Queensland Government’s offset policy provides the framework to ensure there is net gain of biodiversity and it is aligned with the Australian Government’s offset policy for MNES under the EPBC Act.

3.7.4 Enhance

Ongoing adaptive management is critical to provide positive long-term outcomes for MNES by maintaining and enhancing MNES values over time, in both current and future developments within the GBR coastal zone. Enhancing MNES includes rehabilitating degraded ecosystems or restoring cleared ecosystems. Queensland Government contributes significant resources to enhancing MNES impacted by past land clearing or current land use practices.

This hierarchy will effectively ensure that unacceptable impacts on MNES will not occur. With a more strategic approach to offsets, and continued efforts to enhance MNES through other supporting programs, a net gain can be achieved for MNES.

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Figure 3.7.1 The avoid, mitigate, offset approach
3.7.5 Program effectiveness

Queensland Government developed a consistent framework to assess its Program effectiveness, based on the TOR endorsement criteria and other best practice management standards. Examining management responses using this method highlights the strengths and weaknesses in management efforts.

Queensland Government’s has assessed its Program on its ability to:

- identify MNES
- assess impacts to MNES
- avoid, or mitigate and offset likely impacts on MNES
- enhance MNES impacted by past land clearing and current land use practices.

Program effectiveness is graded on a scale of four levels, very effective, effective, partially effective, and ineffective. Table 3.7-1 below outlines the definitions for the grading statements for Program effectiveness.

<table>
<thead>
<tr>
<th>Program effectiveness</th>
<th>Definitions for grading statements</th>
</tr>
</thead>
</table>
| Demonstrated ability to identify MNES (including WHA OUVs) | **Very effective:** MNES are identified early and explicitly in the planning, development and management processes. Identification methods are scientifically proven and well documented. Mapping (where relevant) is regularly reviewed and updated.  
**Effective:** MNES are identified through the planning, development and management system but not explicitly. Identification may not be explicitly documented. Mapping (where relevant) may be once off.  
**Partially effective:** MNES are identified in only in some cases, but are not explicitly required to be considered in planning, development and management processes. There may be significant scientific uncertainty.  
**Ineffective:** MNES are not identified, mapped or integrated into planning, development or management processes in any meaningful way. |
| Effectiveness in assessing impacts    | **Very effective:** MNES values and potential significant impacts from a development proposal identified by an applicant from a comprehensive site survey and are transparently articulated and quantified in the assessment process.  
**Effective:** The potential significant impacts on MNES values from a development proposal are generally described from a high quality trigger map and assessment is based on general guidance.  
**Partially effective:** MNES values are not transparently identified or identified from poor quality data and assessment is based on assumptions about the extent of potential impact.  
**Ineffective:** MNES values are not identified by any sound method and assessment of the significance of impact occurs from a desk-top analysis or not at all. |
| Effectiveness in avoiding impacts     | **Very effective:** Planning, development and management processes effectively and explicitly ensure impacts on MNES are avoided. Mapping (where relevant) of areas of significance is integrated into planning in order to frontload avoidance mechanisms. Cumulative impacts considered upfront in planning and assessment.  
**Effective:** Planning, development and management processes effectively ensure impacts are avoided. Mapping (where relevant) of areas of significance is integrated into some aspects of planning, but may not be explicit.  
**Partially effective:** Planning, development and management processes avoid some impacts on MNES up front, but indirect and cumulative impacts are not well planned for or managed.  
**Ineffective:** Direct, indirect and cumulative impacts on MNES are poorly avoided and mapping (where relevant) is not regularly used to avoid areas of significance. |
<table>
<thead>
<tr>
<th>Program effectiveness</th>
<th>Definitions for grading statements</th>
</tr>
</thead>
</table>
| Effectiveness in mitigating impacts | **Very effective**: Strong systems are in place to minimise the impacts on MNES. Rigorous, scientifically justified conditions applied to use or development.  
**Effective**: Systems are largely in place to minimise the impacts on MNES. Some conditions may be applied to use or development in certain circumstances.  
**Partially effective**: Some systems in place to minimise the impacts on MNES, but may be ad hoc.  
**Ineffective**: Only minimal steps taken to minimise impacts on MNES or there are significant deficiencies in the process or lack of scientific knowledge on which to base measures. |
| Effectiveness in offsetting unavoidable impacts | **Very effective**: Offsets policies explicitly consider MNES and deliver the effective and strategic outcomes that result in a net improvement overall for MNES.  
**Effective**: Offsets policies explicitly consider MNES and deliver ‘like for like’ outcomes that result in no net loss for MNES.  
**Partially effective**: Offsets policies do not explicitly consider MNES, do deliver some tangible outcomes for MNES, but not a net improvement.  
**Ineffective**: Offsets policies do not explicitly consider MNES and the outcomes are insufficient to offset the impacts. |
| Contribution to enhancement of MNES and management of existing pressures | **Very effective**: Legacy impacts well understood and strong measures are in place to recover or improve MNES. Significant resources applied to address key threats.  
**Effective**: Legacy impacts well understood and some measures are in place to recover or improve MNES. Some resources applied to address the key threats.  
**Partially effective**: Legacy impacts understood and measures are in place to recover or improve MNES. Resources applied not sufficient to address the key threats, and impacts are likely to persist.  
**Ineffective**: Legacy impacts poorly understood. No measures in place to recover or improve MNES. |
| Demonstrated ability to adapt system over time to incorporate new knowledge | **Very effective**: Well-designed management systems implemented for effective delivery of planned management actions, including clear governance arrangements in place, appropriate stakeholder engagement, active adaptive management and adequate reporting against goals.  
**Effective**: Well-designed management systems are in place, but not yet fully implemented.  
**Partially effective**: Management systems provide some guidance, but are not consistently delivering around implementation of management actions, stakeholder engagement, adaptive management or reporting.  
**Ineffective**: Adequate management systems are not in place. Lack of consistency and integration of management activities across jurisdictions is a problem. |
| Resourcing, monitoring and compliance | **Very effective**: Financial and staffing resources are largely adequate to address management issues. Biophysical and socioeconomic information is available to inform management decisions. Systems are in place for enforcement and compliance.  
**Effective**: Financial and staffing resources are mostly adequate to address management issues, but may not be secure. Biophysical and socioeconomic information is available to inform decisions, although there may be deficiencies in some areas. Systems are in place for enforcement and compliance.  
**Partially effective**: Financial and staffing resources are unable to address management issues in some important areas. Biophysical and socioeconomic information is available to inform management decisions, although there are significant deficiencies in some areas. There is limited enforcement or compliance.  
**Ineffective**: Financial and staffing resources are unable to address management issues in many areas. Biophysical and socioeconomic information to support decisions is deficient in many areas. Enforcement and compliance mechanisms deficient in many areas. |
3.8 Projected condition and trend

Queensland Government has based the projected condition and trend of MNES on land use and its assumed management intent (i.e. level of protection). Clearly, areas containing MNES values face substantially less long-term risk of decline in condition where located in a conservation area. The reverse is likely to be true for MNES values located in areas identified for development. Using the conventionally accepted risk-based approach – likelihood versus consequence – the following information has been synthesised to assess projected condition and trend over the 25-year life of the Queensland Government’s Program:

- the existing extent, state/condition and trend for MNES
- an understanding of activities and pressures impacting on MNES, including risk to MNES
- the effectiveness of the Program, including forward commitments, to avoid future impacts and enhance MNES
- an assessment of resilience.

The projected risk of the activities and pressures is based on the likelihood and consequence of each threat (Table 3.8.1, Table 3.8.2 and Table 3.8.3).

Table 3.8-1 Grading for likelihood

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Expected frequency of a given threat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almost certain</td>
<td>Expected to occur more or less continuously throughout a year</td>
</tr>
<tr>
<td>Likely</td>
<td>Not expected to be continuous but expected to occur one or more times in a year</td>
</tr>
<tr>
<td>Possible</td>
<td>Not expected to occur annually but expected to occur within a 10 year period</td>
</tr>
<tr>
<td>Unlikely</td>
<td>Not expected to occur in a 10 year period but expected to occur in a 100 year period</td>
</tr>
<tr>
<td>Rare</td>
<td>Not expected to occur within the next 100 years</td>
</tr>
</tbody>
</table>

Table 3.8-2 Grading for consequence

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Extent of the impact based on current management</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Broad Scale</td>
</tr>
<tr>
<td>Catastrophic</td>
<td>Impact is clearly affecting, or would clearly affect, the nature of the ecosystem or heritage value over a wide area.</td>
</tr>
<tr>
<td>Major</td>
<td>Impact is, or would be, significant at a wider level.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Impact is, or would be, present at a wider level.</td>
</tr>
<tr>
<td></td>
<td>Recovery periods of 10 - 20 years likely.</td>
</tr>
</tbody>
</table>
### Table 3.8-3 Grading for overall risk

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Extent of the impact based on current management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor</td>
<td>Impact is, or would be, not discernible at a wider level. Impact would not impair the overall condition of the ecosystem or heritage value, sensitive population or community over a wider level. Recovery periods of 5 - 10 years likely.</td>
</tr>
<tr>
<td>Insignificant</td>
<td>No impact or if impact is, or would be, present then only to the extent that it has no discernible effect on the overall condition of the ecosystem or heritage value. No impact or if impact is, or would be, present then only to the extent that it has no discernible effect on the overall condition of the ecosystem or heritage value.</td>
</tr>
</tbody>
</table>

Given current management arrangements, any threats considered likely or certain to occur are predicted to have insignificant consequences for the values. There may be minor consequences for the values for other less likely threats.

Given current management arrangements, many of the threats considered likely or certain to occur are predicted to have minor consequences for the values, a few may have moderate consequences but none will have catastrophic consequences. Some unlikely threats may have major consequences for the values.

Given current management arrangements, many of the likely or almost certain threats are predicted to have moderate or major consequences for the values. Unlikely events may have catastrophic consequences.

Given current management arrangements, there are likely or almost certain threats that are predicted to have catastrophic consequences on the values.
The projected conditions of particular values depend not only on management, but also on the resilience of the species or ecosystem (i.e. how able it is to withstand and recover from impacts), and the response time after particular impacts. For example, some threatened species are expected to have slow response times to a decline in broadscale clearing compared with TECs. Coastal rainforest communities are predicted to return to structural maturity within two to three decades following management intervention.

For threatened species and ecological communities, the projected trend for the 25-year duration of the Program is based on the level of protection that the REs are expected to experience. This considers that an area of a RE within a national park, state forest or non-urban area will continue to be protected and its extent will remain stable. Areas in the urban footprint are considered to be declining.

For TECs, key species and migratory species, trend predictions are derived by looking at the percentage of each land use category of the remaining RE extent and assuming that certain land uses will have particular impacts on the RE’s condition. For the purposes of this assessment Queensland Government has assumed that if over 75 per cent of the remaining REs are in a conservation area or minimal use area, the TEC or species is considered to be improving; if between 50 and 75 per cent is remaining it is considered to be stable; and if up to 50 per cent is remaining it is considered to be deteriorating. A grading statement for projected trend is presented in Table 3.8.5.

### Table 3.8.4 Matrix for determining overall risk based on likelihood and consequence

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Insignificant</th>
<th>Minor</th>
<th>Moderate</th>
<th>Major</th>
<th>Catastrophic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almost Certain</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>Very High</td>
<td>Very High</td>
</tr>
<tr>
<td>Likely</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>Very High</td>
</tr>
<tr>
<td>Possible</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Unlikely</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Rare</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Source: Adapted from Outlook Report 2009

### Table 3.8.5 Trend for key MNES species and ecological communities

<table>
<thead>
<tr>
<th>Trend</th>
<th>Percentage in conservation area and minimal use area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improving</td>
<td>&gt; 75%</td>
</tr>
<tr>
<td>Stable</td>
<td>&gt; 50% and &lt; 75%</td>
</tr>
<tr>
<td>Deteriorating</td>
<td>&gt; 25% &lt; 50%</td>
</tr>
</tbody>
</table>

There is likely to be an overall improvement in habitats and continuing protection. Protection of the habitat can be assumed to be improving the structural and functional integrity of the habitat.

While there is likely to be future but minimal loss, degradation or alteration in these habitats, this is not persistent and there are likely to be no substantial effects on populations of dependent species.

RE loss, degradation or alteration will continue to occur in a number of areas leading to further persistent, substantial effects on populations of some dependent species.
3.9 Data used and knowledge gaps

The strategic assessment is based on the best available information, including existing reports, scientific data and expert opinion. All references are cited in the text and listed at the end of the report.

Queensland Government has used a number of sources to identify the extent, condition and trend in MNES in the GBR coastal zone and the values underpinning them, including the habitats of threatened species and ecological communities and the breeding and roosting sites of migratory species. These sources include:

- relevant legislation, including the EPBC Act, NC Act and VM Act
- statements of the OUV for the World Heritage properties
- Ramsar sites’ Ecological Character Descriptions (ECD)
- Conservation assessments (Biodiversity Planning Assessments and Aquatic Conservation Assessments)
- Regional Ecosystems (RE) mapping which provides vegetation mapping for vegetation communities based on geology, landform and soil
- Queensland Wetland Mapping
- Great Barrier Reef Outlook Report 2009
- State of the Wet Tropics Report
- Back on Track list of priority species.

A number of Australian Government funded Sustainable Regional Development Program projects were undertaken during 2012–13 to fill significant knowledge gaps for matters relevant to the strategic assessment. Where relevant the outcomes of these projects are incorporated into the report and the reports cited. These projects are:

- Improved dredge material management for the Great Barrier Reef Region: To provide improved information on which to base dredge spoil management decisions for the five major ports in the GBRWHA.
- Environmental Best Practice Port Development: An Analysis of International Approaches: To provide further understanding on international benchmarks in the environmental management of ports, and the potential application of those practices in Australia.
- Identification of impacts and proposed management strategies associated with offshore ship anchorages in the Great Barrier Reef World Heritage Area: To identify environmental impacts of existing offshore anchoring for the five major GBR ports and the likely future impacts of increased shipping.
- Great Barrier Reef coastal ecosystems assessment framework: To examine development impacts in selected basins within the GBR coastal zone to assess present and future development pressures and potential offset opportunities.
- Great Barrier Reef resilience decision framework: To develop a resilience framework to inform decision making in the GBR coastal zone.
- Economic contribution of the Great Barrier Reef: To update understanding of the Great Barrier Reef’s economic contribution, including analysis of commercial and non-commercial uses and detailed regional-scale analysis.
- Geological and geomorphological features of outstanding universal value in the Great Barrier Reef World Heritage Area: To identify geological and geomorphological features of OUV that may not have been previously identified and provide an overview of the pressures affecting values.
- Defining the aesthetic values of the Great Barrier Reef World Heritage Area: To identify and map aesthetic values and analyse the sensitivity of those values to impacts.
- Integrated monitoring framework for the Great Barrier Reef World Heritage Area: To establish a framework for a standardised and integrated ecological, social and economic monitoring program to address critical information needs, align existing monitoring programs and provide a baseline for assessing the condition of values and effects of pressures, as well as the impact on those values. This project is funded through the National Environmental Research Program – Marine Biodiversity Hub.

Data sources and reliability for MNES values vary greatly. For a specified area with a fixed boundary, such as a WHA, the data is reliable and areas are easily mapped. For species, surrogate data is required to approximate its habitat. The reliability of habitat data varies considerably. TECs are often very broadly described, being ecosystems with similar characteristics. The RE associated with each TEC is used as surrogate data. REs are vegetation communities associated with certain landform, geology and soil and have been mapped across Queensland bioregions.

The size and complexity of the GBR coastal zone, and the fact that MNES within this strategic assessment area vary in scale from individual species to the entire GBRWHA, make it impossible to undertake ecological studies on the impacts to, and values of, every MNES. Consequently this strategic assessment...
has leveraged the existing information available from published scientific, informally published, and government literature. A small number of targeted synthesis projects were funded by the Australian Government and coordinated by the GBRMPA to address select knowledge gaps. Results from these projects have been used to support this strategic assessment as appropriate.

Queensland Government recognises there will be gaps in knowledge that cannot be filled as part of the strategic assessment; uncertainties and assumptions have been clearly documented. In the grading systems and assessment of Program effectiveness, the level of confidence in grades is clearly documented taking account of information available to support findings. Also, demonstration cases identify possible future data acquisitions and research priorities that may address identified knowledge gaps.

3.10 Stakeholder engagement

Stakeholder engagement is a central approach to the management of Queensland’s natural assets and has been a constant theme throughout the GBR coastal zone strategic assessment, occurring from the development of the TOR up to the public consultation period for the draft reports. This draft report has been prepared to facilitate public consultation. The public comments from this process will inform the finalisation of this report and will be summarised into the final report at that time.

3.10.1 Preparing terms of reference

The draft TOR for this assessment were available for public comment from February to April 2012. A total of 377 submissions were received by the Queensland Government on the GBR coastal zone TOR. The following key issues were raised during the public consultation and were considered in finalising the TOR:

- defining the scope of management arrangements to be considered
- what methodologies will be used for the strategic assessment
- consistency between the Queensland and the GBRMPA TOR
- criteria for selecting demonstration cases
- how cumulative impacts would be considered
- independent assessment of management effectiveness
- explicit reference be made to the OUV of the GBRWHA

The submissions informed the final TOR, which were to:

- provide greater detail and clarity on the intent of the assessment
- require an independent review
- include criteria for choosing demonstration cases
- have more specific reference to OUV and ESD
- include recommendations for change to seek to achieve a net benefit for the MNES in the GBR coastal zone.

The final TOR were endorsed by the Australian Minister for Sustainability, Environment, Water, Population and Communities on 31 August 2012 (Appendix D).

3.10.2 Preparing the report

This strategic assessment report is in draft form. It has been prepared to enable public consultation and independent review. Outcomes and findings from those processes will inform the document for finalisation. This draft has been prepared in consultation with a range of stakeholders. The Queensland Stakeholder Reference Group was invited to provide high level contributions to the strategic assessment, the group includes representatives from:

- the conservation sector
- regional NRM bodies
- the property industry
- local government
- the resources industry
- Girringun Aboriginal Corporation
- the agricultural industry

In addition to Stakeholder Reference Group interactions, the Queensland Government has engaged with a number of other stakeholder groups during development of the strategic assessment documentation. Presentations regarding the strategic assessment have been provided at the Coast to Coast conference, Major Projects Conference and various Reef Advisory Committee meetings. Individual meetings have occurred with interested stakeholder groups as they have been requested.

Queensland Government officers participated in a number of stakeholder workshops led by the GBRMPA relating to the strategic assessment and taken into account comments received in preparing the strategic assessment documentation.
A number of stakeholders also assisted in peer reviewing different sections of the report, or particular demonstration cases, where they had a role or interest in management.

Additionally, targeted consultation has been undertaken during the development of the many components of the Queensland Program, both across and outside of Queensland Government. For example, consultation across government agencies and with relevant external stakeholders is routinely undertaken before legislative amendments are made, and during the development of statutory instruments.

The individual inputs associated with the strategic assessment are also subject to their own consultation processes:

- Great Barrier Reef Ports Strategy – presentations regarding the Great Barrier Reef Ports Strategy provided to the North Queensland Resource Supply Chain Committee, members of the Natural Resource Management group, and the Queensland Resources Council as well as public consultation.

- Queensland Ports Strategy – the results of public consultation on the Great Barrier Reef Ports Strategy have informed the draft Queensland Ports Strategy. In turn, the draft Queensland Ports Strategy will undergo public consultation concurrently with the strategic assessment.

- Offsets – targeted consultation has been undertaken with some industry groups, across Queensland Government agencies and with the Australian Government.

- Regional Plans – Regional Plan Advisory Committees have been formed and are regularly consulted during the review of existing and development of new regional plans. Community consultation is also undertaken during plan review and development.

- Coastal Management Plan – A reviewed coastal management plan has been prepared and was available for public review and comment between September and October 2013.

- The State Planning Policy - Was subject to public consultation early 2013 and is anticipated to be finalised by late 2013.

- Independent review.

As noted above, this draft report has been prepared to facilitate public consultation and independent review. The independent review is required by the terms of reference and has been commissioned by the Australian Government. This, together with reviews conducted as preparation of this report progressed, will provide for greater transparency and rigour in preparing the Program and strategic assessment reports.

Independent review was not complete by the time this draft was prepared for public consultation. Comments raised in the review process will be addressed at the same time the public consultation period is underway. All comments will be addressed in the final report.

3.10.3 Peer reviews

During document development a wide range of experts, both within and outside the Queensland Government, have peer reviewed different chapters of this report or particular demonstration cases. This includes Queensland Government scientists and policy and operational staff. External to government, peer review was provided by staff of regional NRM bodies, the GBRMPA officers and by members of relevant committees with expertise and knowledge in their field of management.

3.10.4 Independent scientific panel

To ensure a robust methodology, the Reef Water Quality Protection Plan Independent Science Panel (ISP) provided advice on the technical assessment framework that underpins both the Queensland and GBRMPA strategic assessments. The ISP includes:

- Dr Roger Shaw (Chair) with expertise in catchment processes
- Dr Peter Doherty (Australian Institute of Marine Science) with expertise in marine ecology
- Dr Eva Abal (University of Queensland) with expertise in marine health and modelling
- Dr Mike Grundy (CSIRO) with expertise in soils and landscape processes
- Mr Neil Byron with expertise in socio-economic research.

3.10.5 Independent review

The independent review of the full draft documentation for the GBR coastal zone strategic assessment was commissioned by the Australian Government and undertaken by Sinclair Knight Merz to ensure that it adequately addressed the TOR and is supported by rigorous evidence. The purpose of the independent review is to provide a rigorous independent assessment of the Program Report, Strategic Assessment Report and any relevant supporting documentation, ensuring that the documents
transparently and accurately describe and demonstrate the Program. In doing so, the review will consider:

- The presentation, readability and accessibility of the Program report and the Strategic assessment report
- The Program’s representation of potential impacts and the effectiveness of the Program in protecting MNES, including any proposed changes to the Program.

Review findings and actions taken to address the independent review findings will be included as an appendix in the final report.

3.10.6 Summary

A conceptual timeline (not to scale) of the various stakeholder engagement processes that have informed the delivery of the strategic assessment and program report drafts for consultation is provided in Figure 3.10.1. This timeline also identifies the tasks yet to be completed including the incorporation of review feedback and consultation to support finalisation of the strategic assessment and program reports.

![Conceptual timeline of stakeholder engagement process](image-url)