Part A - Appendix A

EMF Panel methodology for identifying the local expression of the OUV of the GBRWHA

Method for identifying the local expression of Outstanding Universal Value within the Great Barrier Reef World Heritage Area

Prepared by: Tom Kaveney, Adaptive Strategies Pty Ltd (2017)
The assistance of staff of the Department of State Development (Qld) and from Kerry Neil and Sally Wilson (GHD) and Rick Morton (RMC) is acknowledged and appreciated.

INTRODUCTION AND RATIONALE

This paper presents a method for identifying the local presence and importance of environmental attributes (also referred to as features) that contribute to the Outstanding Universal Value (OUV) of the Great Barrier Reef World Heritage Area (GBRWHA). It provides a mechanism to evaluate environmental attributes and their contribution to OUV and understand if the Integrity of the World Heritage property is altered in any way as a result of proposed master planning outcomes.

It is adapted from previously accepted approaches and references important policy such as:

- EPBC Act referral guidelines for the Outstanding Universal Value of the Great Barrier Reef World Heritage Area (Commonwealth of Australia 2014)
- Great Barrier Reef Region Strategic Assessment (GBRMPA 2014a)
- Great Barrier Reef Outlook Report (GBRMPA 2014b)
- Reef 2050 Long Term Sustainability Plan (Commonwealth of Australia 2015).

The Reef 2050 LTSP requires master planning to adopt the best practice principles identified in the Independent Review of the Port of Gladstone (CoA 2013) and integrate those principles into port planning and development.

Principle 1 of the Independent Review states that the OUV of the GBRWHA should be an intrinsic consideration in all aspects of environmental management and governance of ports in the Great Barrier Reef region. The Independent Review recognises that planning processes require an understanding of how the OUV of the GBRWHA is expressed in specific areas (i.e. each priority port).

The Ports Act requires master planning to manage impacts on all environmental values within and surrounding the master planned area (including those that contribute to OUV).

This proposed methodology will help determine which environmental attributes at each priority port contribute to OUV (i.e. the local expression of OUV) and also help document and understand how integrity is maintained and potentially impacted at a local level associated with implementation of the master plan. By using this methodology, future risk assessment processes for priority ports will indicate which environmental attributes contribute to the local expression of OUV. Potential impacts on all environmental attributes (regardless of their contribution to OUV) will also still be addressed by the risk assessment. It may be that some features that do not contribute to the local expression of OUV remain a high risk and need to be addressed through the master planning process.

This proposed methodology represents a stand-alone component of the master planning process. This supports transparency about how the OUV of the GBRWHA has been intrinsically considered in priority port master planning. One of the key benefits of the master planning process is that the methodology and subsequent identification of the local expression of OUV in a priority port master planned area will provide an input into future development assessment processes providing benefit for proposed projects.

This method for identifying the contribution to OUV was initially developed and applied to understand the relevant OUV attributes of the GBRWHA at the Port of Abbot Point for the purposes of a cumulative impact assessment of proposed port expansion (ELA and Open Lines 2013). This work was informed by contributions from eminent environmental scientists and world heritage experts, in particular:

- Associate Professor Peter Valentine (James Cook University)
- Professor Peter Harrison (Southern Cross University)
- Emeritus Professor Peter Saenger (Southern Cross University)
- Dr Peter Driscoll (consulting scientist).

This methodology recognises that for a World Heritage property of the size and diversity of the GBR it is necessary to develop a method that evaluates contributions to OUV at a local or site specific scale to ensure protective management measures can be identified.

The methodology has been adapted and applied to a number of projects and reports.

Formal studies that have previously used this methodology (or a variation on this methodology) include:

- Adaptive Strategies 2015. Port of Hay Point Sustainable Sediment Management Project (in prep).
- Adaptive Strategies and Open Lines Environmental Consulting (Open Lines) 2016. Abbot Point Strategic Planning Project – environmental, values input. Prepared for North Queensland Bulk Ports.
- Adaptive Strategies and Open Lines Environmental Consulting (Open Lines) 2015. Abbot Point Master Planning. Supporting report – environmental, social and cultural heritage values. Prepared for the Queensland Department of State Development.
- CDM Smith 2013. T0 Environmental Impact Statement. Prepared for Adani Abbot Point Terminal Pty Ltd.
- Eco Logical Australia (ELA) and Open Lines Environmental Consulting (Open Lines) 2013. Abbot Point Cumulative Impact Assessment. Prepared for North Queensland Bulk Ports Corporation Limited.
- Worley Parsons Consulting (WPC) 2014. Abbot Point Port and Wetland Project. Preliminary Documentation.
- Worley Parsons Consulting (WPC) 2014. Abbot Point Dredging and Onshore Placement of Dredged Material Project.

Additionally the application of this methodology in the Abbot Point Cumulative Impact Assessment was used as a case study in the:

- State of Queensland (Qld) 2014. Great Barrier Reef Coastal Zone Strategic Assessment.
- Great Barrier Reef Marine Park Authority 2014. Great Barrier Reef Region Strategic Assessment: Strategic assessment report.

1. USING THIS METHODOLOGY

This methodology provides a guide for identifying the local presence and contribution of environmental attributes to the OUV within the GBRWHA. The methodology does not replace the need to engage and consult with experts, local managers and community on what might contribute to OUV at a local scale. A level of analysis and thought about contributions will also still be required.

The methodology should be applied with consideration of Commonwealth Government and Queensland Government legislation, and policies relevant to environmental protection, particularly to the OUV of the GBRWHA.

The methodology has been developed with a focus on supporting priority port master planning under the *Sustainable Ports Development Act 2015*, however it may form a reference tool for other initiatives and projects within the Great Barrier Reef (GBR) region.

The methodology has drawn on a number of informative sources and guidelines, which should be read in conjunction with this methodology:

- Commonwealth of Australia (CoA) 2015. Reef 2050 Long Term Sustainability Plan.
- Department of Environment (DoE) 2014. EPBC Act referral guidelines for the Outstanding Universal Value of the Great Barrier Reef World Heritage Area.
- Great Barrier Reef Marine Park Authority (GBRMPA) 2014a. Great Barrier Reef Outlook Report 2014.
- UNESCO 2016. Operational Guidelines for the Implementation of the World Heritage Convention. World Heritage Committee, Paris.

More specifically the methodology has been informed and has incorporated relevant elements from the:

- Commonwealth of Australia (CoA) 2016. Reef 2050 Plan – Policy guideline for decision makers.

The methodology will ensure that the OUV of particular development locations (for example, priority ports master planned areas) is properly considered and incorporated into future planning and decision-making.

2. METHOD FOR IDENTIFYING THE LOCAL PRESENCE OF OUV WITHIN THE GBRWHA

The method comprises two components:

1. Contextual information about OUV and the GBRWHA to provide a framework for the analysis; and
2. A process to be applied at the local scale.

CONTEXTUAL INFORMATION ABOUT OUV AND THE GBRWHA

All World Heritage properties have OUV. The concept of OUV underpins the basis for listing properties on the World Heritage List and protecting and managing World Heritage properties. OUV is defined in the *Operational Guidelines for the Implementation of the World Heritage Convention* (the Guidelines, UNESCO 2016). The definition states that OUV is "cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity."

For a World Heritage Property to be considered to have OUV, it must:

a) meet one or more of the ten World Heritage criteria listed in the Guidelines (UNESCO 2016);

b) meet the conditions of integrity and/or authenticity (noting that authenticity is not relevant to the GBR as a natural area); and

c) have an adequate protection and management system.

STATEMENT OF OUV FOR THE GBRWHA

The OUV of a World Heritage Property is articulated in a Statement of OUV that is normally prepared at the time of inscription. Besides describing the features of the property that contribute to its OUV, the Statement of OUV provides the basis for the future protection and management of the property.

A Statement of OUV was not prepared for the GBRWHA at the time of inscription in 1981. However a retrospective Statement of OUV was prepared and adopted by the World Heritage Commission in July 2012 (GBRMPA 2012). The statement includes the following:

> *"As the world's most extensive coral reef ecosystem, the Great Barrier Reef (GBR) is a globally outstanding and significant entity… The latitudinal and cross-shelf diversity, combined with diversity through the depths of the water column, encompasses a globally unique array of ecological communities, habitats and species. This diversity of species and habitats, and their interconnectivity, make the GBR one of the richest and most complex natural ecosystems on earth. There are over 1,500 species of fish, about 400 species of coral, 4,000 species of mollusc, and some 240 species of birds, plus a great diversity of sponges, anemones, marine worms, crustaceans, and other species. No other World Heritage property contains such biodiversity. This diversity, especially the endemic species, means the GBR is of enormous scientific and intrinsic importance, and it also contains a significant number of threatened species. At time of inscription, the IUCN evaluation stated "...if only one coral reef site in the world were to be chosen for the World Heritage List, the Great Barrier Reef is the site to be chosen."*

CRITERIA FOR ASSESSING OUV

For a property to be listed, it must meet one or more of the following World Heritage criteria:

- Criterion (i) represent a masterpiece of human creative genius.
- Criterion (ii) exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design.
- Criterion (iii) bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared.
- Criterion (iv) be an outstanding example of a type of building, architectural or technological ensemble or landscape that illustrates (a) significant stage(s) in human history.

- Criterion (v) be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change.
- Criterion (vi) be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria).
- Criterion (vii) contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.
- Criterion (viii) be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.
- Criterion (ix) be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals.
- Criterion (x) contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of Outstanding Universal Value from the point of view of science or conservation.

The GBRWHA meets four of the ten World Heritage criteria: Criterion (vii), Criterion (viii), Criterion (ix) and Criterion (x).

The table on the following pages is derived from the retrospective Statement of OUV and provides an outline of the features that contribute to the OUV of the GBRWHA.

It is also worth nothing that the Statement of OUV for the GBRWHA acknowledges that, " Human interaction with the natural environment is illustrated by strong ongoing links between Aboriginal and Torres Strait Islanders and their sea-country, and includes numerous shell deposits (middens) and fish traps, plus the application of story places and marine totems." Accordingly, while not directly part of the listing criteria for the GBRWHA it is also worth recording and considering any important cultural heritage sites or links that exist within the study area. Such cultural features may be expressed through a clear and continuing linkage to the use and significance of the area, as demonstrated by the presence of artefacts, use or story telling.

Table 1: Description of the OUV against the relevant World Heritage Criteria

World Heritage listing criteria	OUV descriptions
Criterion vii: contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance	• The GBR is one of a few living structures visible from space. • From the air the GBR is a vast mosaic pattern of reefs, islands and coral cays, which produce an unparalleled aerial panorama of seascapes comprising diverse shapes and sizes. • On many of the cays there are spectacular and globally important breeding colonies of seabirds and marine turtles. • Beneath the ocean surface, there is an abundance and diversity of shapes, sizes and colours. • Other superlative natural phenomena include the annual coral spawning, migrating whales, nesting turtles, and significant spawning aggregations of many fish species.
Criterion viii: be outstanding examples representing major stages of earth's history	• The GBR extends 2,000 km along Queensland's coast and is a globally outstanding example of an ecosystem that has evolved over millennia • The area has been exposed and flooded by at least four glacial and interglacial cycles, and over the past 15,000 years reefs have grown on the continental shelf.

World Heritage listing criteria	OUV descriptions
	• During glacial periods, sea levels dropped, exposing the reefs as flat-topped hills of eroded limestone. Large rivers meandered between these hills and the coastline extended further east. • During interglacial periods, rising sea levels caused the formation of continental islands, coral cays and new phases of coral growth. • The environmental history of the GBR can be seen in cores of old massive corals. • Today the GBR forms the world's largest coral reef ecosystem, ranging from inshore fringing reefs to mid-shelf reefs, and exposed outer reefs, including examples of all stages of reef development.
Criterion ix: be outstanding examples representing significant ongoing ecological and biological processes	• The globally significant diversity of reef and island morphologies reflects ongoing geomorphic, oceanographic and environmental processes. • The complex cross-shelf, longshore and vertical connectivity is influenced by dynamic oceanic currents and ongoing ecological processes such as upwellings, larval dispersal and migration. • Ongoing erosion and accretion of coral reefs, sand banks and coral cays combine with similar processes along the coast and around continental islands. • Biologically the unique diversity of the GBR reflects the maturity of an ecosystem that has evolved over millennia; evidence exists for the evolution of hard corals and other fauna. • Globally significant marine faunal groups include over 3,000 species of molluscs, over 1,500 species of fish, plus a great diversity of sponges, anemones, marine worms, crustaceans, and many others. • Human interaction with the natural environment is illustrated by strong ongoing links between Aboriginal and Torres Strait Islanders and their sea-country.
Criterion x: contain the most important and significant natural habitats for in-situ conservation of biological diversity	• The enormous size and diversity of the GBR means it is one of the richest and most complex natural ecosystems on earth, and one of the most significant for biodiversity conservation. • The GBR contain ~ 400 species of corals in 60 genera. There are also large ecologically important inter-reefal areas. • The shallower marine areas support half the world's diversity of mangroves and many seagrass species. • The waters also provide major feeding grounds for one of the world's largest populations of the threatened dugong. • At least 30 species of whales and dolphins occur here, and it is a significant area for humpback whale calving. • Six of the world's seven species of marine turtle occur in the GBR. As well as the world's largest green turtle breeding site at Raine Island, the GBR also includes many regionally important marine turtle rookeries. • Some 242 species of birds have been recorded in the GBR.

INTEGRITY

All World Heritage properties are required to meet the conditions of integrity. This is defined by the Operational Guidelines (UNESCO 2016) as "a measure of the wholeness and intactness of the natural and/or cultural heritage and its features." An assessment of the integrity of a property is required to determine the extent to which the property:

- Includes all elements necessary to express its OUV;
- Is of adequate size to ensure the complete representation of the features and processes which convey the property's significance; and
- Suffers from adverse effects of development and/or neglect.

For properties nominated under criteria (vii) - (x), such as the GBR, bio-physical processes and landform features should be relatively intact. However, it is recognised within the Guidelines that areas may not be entirely pristine and that natural areas are in a dynamic state, and to some extent involve interactions with people.

In the case of the GBR this aspect is particularly important given the large size of the property; its location adjacent to and including human settlements and the pre-existing presence of human settlements, infrastructure and urban recreational and industrial activities within the property prior to its listing. Accordingly an important aspect of integrity is the state and condition of the property at time of listing. As such the (retrospective) Statement of OUV is an important reference document when considering integrity.

The Statement of OUV (GBRMPA 2012) concludes that in relation to integrity:

- The integrity of the GBR is "enhanced by the unparalleled size and current good state of conservation across the area."
- While a number of natural pressures occur (e.g. cyclones and crown-of-thorns starfish outbreaks), given the scale of the GBR "most habitats or species groups have the capacity to recover from disturbance or withstand ongoing pressures."
- "The property is largely intact and includes the fullest possible representation of marine ecological, physical and chemical processes from the coast to the deep abyssal waters enabling the key interdependent elements to exist in their natural relationships."
- Effective conservation programs are essential in areas adjacent to the GBR (e.g. coastal catchments) given that some of the key processes of the reef occur outside its boundaries.

This methodology provides a means to develop a local statement of integrity for the area once the local attributes of OUV have been identified and their contribution evaluated.

WORLD HERITAGE AREA MANAGEMENT

All World Heritage properties are required to be adequately managed to ensure that their OUV (including the conditions of integrity at the time of inscription) are sustained or enhanced over time (UNESCO 2016).

The Operational Guidelines outline the broad level requirements for effective management. This includes:

- Appropriate legislative, regulatory and contractual measures;
- Boundaries for effective protection;
- Buffer zones; and
- Appropriate management systems.

Finally, the Operational Guidelines also provide for the sustainable use of World Heritage properties where that use does not adversely impact on the OUV of the property.

The Statement of OUV (GBRMPA 2012) outlines the management arrangements that are in place for the GBRWHA. Responsibility for management is shared between the Commonwealth and Queensland Governments. Broadly these arrangements are:

- GBRMPA (an independent Australian Government agency) is responsible for protection and management of the GBR Marine Park. They administer *The Great Barrier Reef Marine Park Act 1975*, which is a component of the broader environment portfolio.
- The Queensland Government is responsible for management of the Great Barrier Reef Coast Marine Park which is established under the *Marine Parks Act 2004* (Qld). This area is contiguous with the GBR Marine

Park and covers the "area between low and high water marks and many of the waters within the jurisdictional limits of Queensland." The Queensland Government is also responsible for management of most of the islands within the GBR. Both marine parks have consistent zoning and permitted activity schemes.

- The Commonwealth Government is responsible for administration of the EPBC Act, which provides an overarching mechanism for protecting World Heritage areas from inappropriate development, including actions taken inside or outside the GBRWHA, which could impact on its value.
- A range of other Queensland and Commonwealth legislation also protects the World Heritage of the GBR, for example, by addressing such matters as water quality, shipping management, port planning, sea dumping (dredging), fisheries and environmental management.
- There are a range of non-statutory mechanisms in place that protect the World Heritage of the GBR (e.g. industry codes of practice, stewardship programs).

In addition to these broad governance arrangements, the Australian and Queensland Governments have introduced a number of administrative and guidance documents to help protect the GBR, these include:

- ***Intergovernmental Agreement***

  In 2009, both the Australian and Queensland Governments signed the Great Barrier Reef Intergovernmental Agreement, formalising the approach to manage marine and land environments within the GBRWHA.

- ***GBR Strategic Assessment***

  The Australian and Queensland Governments have completed two complimentary strategic assessments of the GBR region:

  - State of Queensland (Qld) 2014. Great Barrier Reef Costal Zone Strategic Assessments. July 2014
  - Great Barrier Reef Marine Park Authority 2014a, Great Barrier Reef Region Strategic Assessment: Strategic assessment report. July 2014.

  Strategic assessments enable a 'big-picture' approach to environment and heritage protection that provides certainty in the long term, by determining suitable areas for protection, development and the type of development that should be allowed and the conditions under which such development may proceed.

- ***Reef 2050 Long-Term Sustainability Plan***

  Stemming from the outcomes of the strategic assessment a Reef 2050 Long-Term Sustainability Plan (CoA 2015) has been developed that targets areas of action and seeks to address gaps for future management of the GBRWHA.

- ***EPBC Act Referral Guidelines***

  The EPBC Act protects the World Heritage values of the GBRWHA from actions that have, will have or are likely to have a significant impact on those values. The protection and management of World Heritage properties should ensure that their values at the time of inscription are sustained and enhanced over time. This is done primarily through the protection of a property's OUV. These referral guidelines are intended to provide guidance to proponents on the need to refer an action to the Commonwealth Minister for the Environment and Energy for assessment and a decision.

- ***Great Barrier Reef Outlook Report***

  Produced every 5 years the GBR Outlook Report provides an assessment and findings on the Great Barrier Reef's health, pressures and likely future condition.

KEY ATTRIBUTES OF THE GBRWHA

The Statement of OUV identifies the key features that contribute to the OUV of the GBRWHA. It is noted in the EPBC Act Referral Guidelines (DoE 2014) that features may not be expressed equally over the whole GBRWHA and that features can change over time.

Table 2: Key features of OUV for the GBRWHA (DOE 2014)

Natural beauty and natural phenomena (Criterion (vii))	Major stages of the Earth's evolutionary history (Criterion (viii))	Ecological and biological processes (Criterion (ix))	Habitats for conservation of biodiversity (Criterion (x))
Superlative natural beauty above and below the water	Continental shelf	Significant diversity of reef and island morphologies that reflects ongoing geomorphic, oceanographic and environmental processes	Diversity supporting marine and terrestrial species (global conservation significance)
String of reef structures	Flat-topped hills of eroded limestone	Cross-shelf, longshore and vertical connectivity	Coral reefs (400 species of corals in 60 genera)
Mosaic patterns of reefs, islands and coral cays that produce an unparalleled aerial panorama of seascapes	Continental islands	Coral reefs, sand banks and coral cays	Diversity of mangroves
Green vegetated islands	Coral cays	Beds of *Halimeda* algae	Diversity of seagrass
Spectacular sandy beaches	New phases of coral growth	Evolution of hard corals	Dugong
Azure waters	Old massive corals	Other fauna, including microfauna	Species of whales
Vast mangrove forests	Coral reef ecosystem	Over 4000 species of molluscs and over 1500 species of fish, plus a great diversity of sponges, anemones, marine worms, crustaceans	Species of dolphins
Vegetated mountains	Inshore fringing reefs, mid-shelf reefs, and exposed outer reefs	Vegetation of the cays and continental islands	Humpback whale calving
Lush rainforest gullies	Processes of geological and geomorphic evolution	Important role of birds, such as the pied imperial pigeon, in processes such as seed dispersal and plant colonisation	Marine turtles
Breeding colonies of seabirds and marine turtles	Unique and varied seascapes and landscapes		Green turtle breeding

Natural beauty and natural phenomena (Criterion (vii))	Major stages of the Earth's evolutionary history (Criterion (viii))	Ecological and biological processes (Criterion (ix))	Habitats for conservation of biodiversity (Criterion (x))
Green turtle breeding	Continental slope		Marine turtle rookeries
Over-wintering butterflies	Deep oceanic waters		242 species of birds
Hard and soft corals	Abyssal plains		22 seabird species breeding (cays and some continental islands have globally significant breeding sites)
Thousands of species of reef fish			Plant species and diversity and endemism (species being unique to a defined geographic location)
Coral spawning			Coral cays
Migrating whales			
Nesting turtles			
Significant spawning aggregations of many fish species			

3. PROCESS FOR DETERMINING LOCAL REPRESENTATION AND CONTRIBUTION OF OUV

The process for determining the local representation and contribution of OUV within the GBRWHA (that is, the local expression of OUV) is based around understanding which attributes are present and how important those attributes are within the context of the wider GBRWHA.

Most environmentally important areas are made up of multiple attributes, such as various landforms, seascapes or biological entities such as species, habitats and ecosystems. For instance the presence of important populations of migratory shorebirds will be achieved through the presence of multiple species, varying habitats (feeding, nesting, roosting) and locations.

In the case of the GBR, its OUV is a reflection of the collective expression of a vast number of values. As such, the process for determining the local expression of OUV involves:

1. Identification of the attributes that occur within the local area (or surrounds)
2. Analysis of the 'importance' of the presence of those attributes within the context of the broader GBRWHA.

In other words words "what" and "where" are attributes located and "why" are they important in the context of the GBR's World Heritage listing?

Figure 1 outlines the process to follow to identify attributes and there contribution to the local expression of OUV. The process is then further explained below.

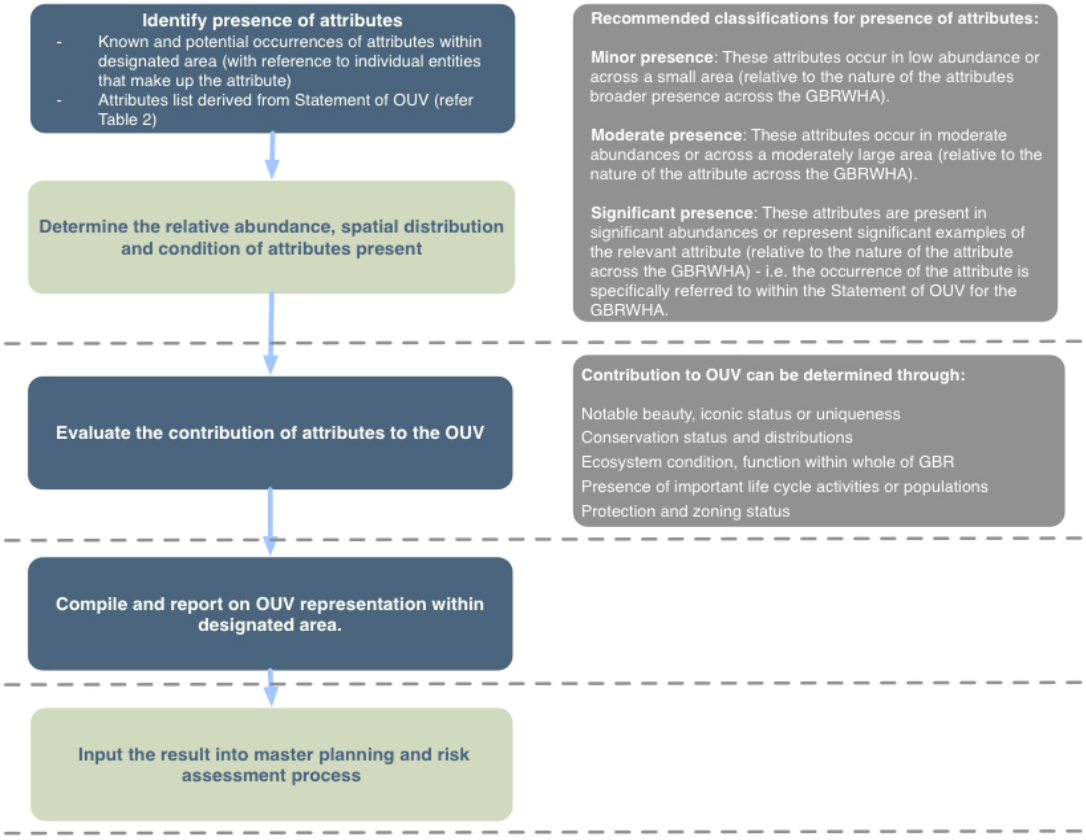

Figure 1: Process for determining local contribution to OUV

IDENTIFICATION OF ATTRIBUTES

Identification of attributes that occur within the local area (or surrounds) should be based on the best available information.

Information can be derived from a range of sources and may not require additional specific studies if sufficient information already exists. Likely sources of information include:

- Port environmental management plans
- Port monitoring programs (e.g. regular coral, seagrass, water quality data)
- Port customer monitoring (e.g. tailwater and dust data)
- Local Government Environment Plans and studies
- Baseline studies for development proposals (Environmental Impacts Statements, etc.)
- Great Barrier Reef Region Strategic Assessment (GBRMPA 2014a)
- Great Barrier Reef Coastal Zone Strategic Assessment (State of Queensland 2014)
- Great Barrier Reef Outlook Report (GBRMPA 2014b)
- Qld Department. of the Environment and Heritage Protection databases
- Commonwealth DoEE Protected Matters Search Tool
- Subject matter experts, traditional owners and local residents.

It may also be necessary to commission specific studies where gaps in information are identified to ensure that all relevant environmental attributes are addressed, outlining the respective condition and contribution of those attributes. Significantly contributing attributes can then be considered further as part of the environmental risk assessment process.

Accordingly, an early step in the process is to identify which environmental attributes are present and need to be considered as contributing to OUV. The GBR Outlook Report, the EPBC Act listings for matters of National Environmental Significance (such as threatened species and migratory species), the Nature Conservation Act listings and other materials and publications provide a useful reference for this work.

PRESENCE OF ATTRIBUTES

For those attributes that are present, an analysis should be carried out to determine the location, extent and distribution of the attribute within the study area. This should where possible be accompanied by information (spatial or contextual) on the distribution and occurrence more broadly within the GBRWHA or adjacent coastal areas. The following terms and definitions are recommended as a means of classifying the presence of attributes:

- Minor presence: These attributes occur in low abundance or across a small area (relative to the nature of the attributes broader presence within the GBRWHA). Noting that a low abundant attribute that is rare within the GBRWHA may still be important. Temporary fluctuations or seasonal variation should be considered. Example of low abundance might include:
  - Small isolated natural ecosystems (coral, vegetation communities etc) of less than 10 or 20 hectares
  - Small number of non breeding species (turtles, dolphins dugong etc) that are foraging in the area
  - Individual occurrences of natural attributes (headlands, beaches, islands) that are not unique or notable.
- Moderate presence: These attributes occur in moderate abundance or across a moderately large area (relative to the nature of the attribute across the GBRWHA). Examples may include:
  - Migratory shorebird aggregations of less than 0.1% of flyway population
  - Endangered ecosystems and habitats of 20-100 h
  - Minor nesting beaches for turtles (e.g. with small numbers of nesting turtles <20)
- Significant presence: These attributes are present in significant abundances or represent significant examples of the relevant attribute (relative to the nature of the attribute across the GBRWHA). Examples:
  - Raine Island turtle nesting
  - Caley Valley wetland migratory bird habitats
  - Whitsunday Islands and beaches
  - Northern GBR reefs and islands

ATTRIBUTE CONTRIBUTION TO OUV

The specific attributes of the OUV of the GBRWHA in relation to the World Heritage criteria are numerous and collectively contribute to the OUV of the GBR. The occurrence and distribution of these attributes are inconsistently spread across the whole 348,000 sq. km of the World Heritage Area with some more numerous than others.

A particular attribute may be present in a particular location and may well be of importance due to its locally high value in terms of representation, appreciation or biological contribution; while in another area it may be a lower value as it does not provide the same ecological function (e.g. recruitment and breeding), representation of heritage or amenity. The influences of human appreciation, geography, climatic distribution, geology, oceanography and ecological life cycles all influence where and at what level a particular attribute may contribute to OUV.

Many of the attributes presented in the Statement of OUV are relevant to several listing criteria. Therefore, any analysis of OUV may be easier to structure around individual attributes rather than the listing criteria *per se*.

The following terms and definitions are recommended as a means of classifying the contribution of locally occurring attributes to OUV:

- Minor contribution: The attribute is present however it occurs in low abundance or singularly and is not:
  - essential to the sustainability of the attribute (e.g. substantial breeding population)
  - recognised as a key feature of the GBRWHA
  - included in the retrospective Statement of OUV
  - iconic, unique or a high quality example of the attribute.
- Moderate contribution: These attributes occur in moderate abundance or across a moderately large area but are not the prime occurrence or representation of the attribute within the GBRWHA. The attribute does however represent an attribute for which the GBR was listed as World Heritage.
- Significant contribution: These attributes represent locally important examples of the attribute relative to the nature of the attribute across the GBRWHA. Such an attribute may be specifically referred to within the Statement of OUV for the GBRWHA or defined by other legislation, planning instrument or environmental assessment (e.g. GBR Outlook Report). The occurrence of the attribute locally is a prime example mentioned in the retrospective Statement of OUV. Prime examples are listed in Tables 3 to 6. These attributes should be considered environmental values.

PROCESS FOR THE DETERMINATION OF OUV AT A LOCAL SCALE

The determination of whether the local presence of an attribute is making a contribution to OUV should consider:

- The notable or iconic status of the attribute locally, is it recognised or mentioned in publications as a prime example or value of the region. For instance, the attribute is essential for maintaining the beauty of the WHA. Is it a site or attribute that is mentioned in the retrospective Statement of OUV, a local focal point or significant Reef related tourist attraction?
- The conservation status of the attribute at a National or State level – is the attribute listed under legislation (e.g. threatened species, Ramsar site, Heritage register, etc.). Does its local presence meet EPBC Act (or other) definitions of significance, important population or critical habitat?
- What is the condition/trend of the attribute as recorded in the latest GBR Outlook Report. Rarer attributes in good condition will be of greatest value but also attributes that are in decline may require particular focus.
- Does the local presence of the attribute contribute to the ongoing sustainability of the attribute more broadly, for instance key questions to ask are:
- For biodiversity attributes, is the local presence a key aggregation, breeding, feeding or recruitment location? Does it support an important proportion of the greater population?
- Would the loss or decline of the local attribute affect the overall conservation status of the attribute (potentially altering its legal listing status)?
- Is the local presence, unique, unusual or highly notable? Is it a prime example of the attribute locally or regionally or do better and multiple examples exist elsewhere with the GBR region?

- Is the presence of the attribute specifically protected in addition to National and State legislative protections (e.g. local or regional reserve)?
- Would the loss of the attribute locally result in a loss or significant decline in the OUV of the whole of the GBRWHA? For instance, would the loss put the GBR at risk of being listed as a WHA in danger? (refer to World Heritage Guidelines).

The following series of tables provide an outline of specific examples and descriptions of what may constitute a contribution to OUV for each attribute.

TABLE 3: CONTAIN SUPERLATIVE NATURAL PHENOMENA OR AREAS OF EXCEPTIONAL NATURAL BEAUTY AND AESTHETIC IMPORTANCE (CRITERION VII)

The following table identifies the key attributes that contribute to the OUV of natural beauty and natural phenomena (Criterion vii) of the GBRWHA. The condition and trend for the attribute is taken from GBR Outlook Report 2014 – these are GBR wide ratings that provide context only. The final column provides examples or descriptions of when each attribute might be considered to make a significant contribution to OUV.

GRB wide attributes – Natural beauty and natural phenomena (Criterion (vii))	GBR Wide Condition	GBR Wide Trend	Significant contribution to OUV (with examples))
Superlative natural beauty above and below the water	Good	-	Superlative natural beauty is especially evident in the northern and offshore coral reefs and aerial vistas. Hinchinbrook Island is an example of a location that has retained its spectacular natural scenery. Coral spawning, migrating whales, nesting turtles and spawning aggregations of fish species are all contributors to the definition of superlative natural beauty. Pristine and good condition natural environments are considered significant contributions to OUV and would include: • Continental islands with vegetation coverage and sandy beaches • Coral cays and fringing reefs. • Reef systems with corals, fish and other marine life. • Abundance of natural features, reefs, islands. Prime examples include: Whitsunday Islands, Princess Charlotte Bay, outer reef systems and the outer Capricorn-Bunker Group. Most coral spawning occurs annually in October or November and is a natural phenomenon that attracts interest from scientists and tourists. Essential for the continued health and growth of the coral reef system.
Mosaic patterns of reefs, islands and coral cays that produce an unparalleled aerial panorama of seascapes	Good	-	
Azure water	-	-	
String of reef structures	Poor	Deteriorating	
Coral assemblages of hard and soft corals	Poor	Deteriorating	
Coral spawning	-	-	
Thousands of species of reef fish & significant spawning aggregations of fish	Good	Deteriorating	Genetic connectivity between reef areas. Pristine and good condition reefs with a high abundance and diversity of species
Migrating whales	Good	Improving	Dwarf minke whales continue to visit the northern region each winter. Populations of humpback whales continue to increase - notable aggregation areas for breeding and resting are well documented, however, with an increasing population new areas may arise at different times.

GRB wide attributes – Natural beauty and natural phenomena (Criterion (vii))	GBR Wide Condition	GBR Wide Trend	Significant contribution to OUV (with examples))
Breeding colonies of marine turtles	Poor	No consistent trend	Six of the world's seven species of marine turtle occur within the GBR, with globally significant nesting areas for four species: loggerhead, green, hawksbill and flatback turtles. The significance of Raine Island as an important turtle rookery is recognised in the World Heritage listing.
Green vegetated islands	Good	Deteriorated	See above
Spectacular white sandy beaches	Good	Stable	See above
Vast mangrove forests	Good	Stable	The highest diversity of mangrove forests occurs in the far north. Vast forests in Hinchinbrook Channel. Many bays and river systems support areas of mangrove forest. Good connectivity between catchments, mangrove communities and coral reefs provide flow-on benefits for coastal ecosystems and contribute to coral reef resilience.
Vegetated mountains	-	-	See above
Lush rainforest gullies	Good		Wet Tropics Rainforest, which is inscribed separately on the World Heritage List.
Over-wintering butterflies	-	-	Seen by the Australian Government to enhance the aesthetic value of the GBR. Occur on islands and on the edge of tropical rainforest.
Breeding colonies of seabirds	Poor	No consistent trend	Islands and cays supporting breeding populations. Important seabird areas include Raine Island, Michaelmas Cay, the islands of the Capricorn-Bunker Group and the cays of the Swain Reefs.
Green turtle breeding & nesting turtles	Poor	No consistent trend	High density turtle nesting locations and sites where nesting and recruitment help support and maintain the wider population such as Raine Island. Other important nesting islands include Milman Island, Moulter Cay, Wild Duck Island. Peak Island and cays of the Capricorn-Bunker Group.

TABLE 4: BE OUTSTANDING EXAMPLES REPRESENTING MAJOR STAGES OF EARTH'S HISTORY, INCLUDING THE RECORD OF LIFE, SIGNIFICANT ON-GOING GEOLOGICAL PROCESSES IN THE DEVELOPMENT OF LANDFORMS, OR SIGNIFICANT GEOMORPHIC OR PHYSIOGRAPHIC ATTRIBUTES (CRITERION VIII)

The following table identifies the key attributes that contribute to the OUV of major stages of Earth's evolutionary history (Criterion viii) of the GBRWHA. The condition and trend for the attribute is taken from GBR Outlook Report 2014 – these are GBR wide ratings that provide context only. The final column provides examples or descriptions of when each attribute might be considered to be contributing to OUV.

GRB wide attributes – Major stages of the Earth's evolutionary history (Criterion (viii))	GBR Wide Condition	GBR Wide Trend	Significant contribution to OUV (with examples)
Unique and varied seascapes and landscapes	Poor	-	Unique, diverse, extensive and natural vistas and ecosystems. Seascapes include island grous such as the Whitsunday Group of islands that has a broad diversity of islands, natural features and sea passages. Outer reef systems, coral cays and fringing reefs. Landscapes including continental islands with vegetation cover, mainland coastal mountains , wetlands and mangroves. Sandy beaches and river systems. Unique landscapes include the adjacent Wet Tropics World Heritage Area which extends from Cooktown to Townsville (contains almost 30 rainforest communities, with many species in many layers of vegetation).
Continental shelf	-	-	The continental slope is a complex area composed of relic reefs, landslides, canyons and plateau that extends down to more than 1000 metres. It comprises approximately 15 per cent of the Region or about 51,900 square kilometres.
Flat-topped hills of eroded limestone	-	-	Large reef complexes associated with outer regions of the GBR provide evidence of flat topped hills of eroded limestone which developed during glacial periods when sea levels dropped.
Continental islands	-	-	Islands that are geologically related to the Australian mainland and were typically formed when rising seas (for example, at the end of an ice age) cut off part of the land from the continent. Inshore islands such as Curtis Island and Magnetic Island and offshore groups such as the Brampton and Lindeman island groups.

GRB wide attributes – Major stages of the Earth's evolutionary history (Criterion (viii))	GBR Wide Condition	GBR Wide Trend	Significant contribution to OUV (with examples)
Coral cays			Large and intact areas of coral reefs and cays. The islands and reefs of the Capricorn and Bunker Island group provide an example of an ecosystem that has evolved over millennia, has all stages of reef development and almost all geomorphological evolutionary processes remain intact.
Old massive corals			
Coral reef ecosystem	Poor	Decline	
Inshore fringing reefs, mid-shelf reefs, and exposed outer reefs including examples of all stages of reef development	Poor	Decline	
Processes of geological and geomorphic evolution	-	-	Coral reefs, cays and continental islands. Most components of the GBR complex (coral reefs, cays and continental islands) provide examples of geological and geomorphic evolution.
Deep oceanic waters	-	-	Deep oceanic waters east of the Great Barrier Reef in the Coral Sea (an area that is still experiencing geological formation processes as partly evidenced by seismic activity).

TABLE 5: BE OUTSTANDING EXAMPLES REPRESENTING SIGNIFICANT ON-GOING ECOLOGICAL AND BIOLOGICAL PROCESSES IN THE EVOLUTION AND DEVELOPMENT OF TERRESTRIAL, FRESH WATER, COASTAL AND MARINE ECOSYSTEMS AND COMMUNITIES OF PLANTS AND ANIMALS (CRITERION IX)

The following table identifies the key attributes that contribute to the OUV of natural beauty and natural phenomena (Criterion ix) of the GBRWHA. The condition and trend for the attribute is taken from GBR Outlook Report 2014 – these are GBR wide ratings that provide context only. The final column provides examples or descriptions of when each attribute might be considered to be contributing to OUV.

GRB wide attributes – Ecological and biological processes (Criterion (ix))	GBR Wide Condition	GBR Wide Trend	Significant contribution to OUV (with examples)
Significant diversity of reef and island morphologies that reflects ongoing geomorphic, oceanographic and environmental processes	-	-	Coral reefs are the cornerstone of the Great Barrier Reef ecosystem and its evolutionary history. Their species diversity, habitat and natural beauty are major contributors to the Reef's outstanding universal value as a world heritage area. The Great Barrier Reef is the world's largest coral reef ecosystem; ranging over 14 degrees in latitude and comprising more than 2900 separate coral reefs. Large and intact areas of coral reefs and cays. The islands and reefs of the Capricorn and Bunker Island group provide an example of an ecosystem that has evolved over millennia, has all stages of reef development and almost all geomorphological evolutionary processes remain intact.
Vegetation of the cays and continental islands	-	-	
Evolution of hard corals	-	-	
Coral reefs, sand banks and coral cays	-	-	
Cross-shelf, longshore and vertical connectivity	Good	Stable	The Region has a total water volume of around 7200 cubic kilometres. This open water habitat is critical to the healthy functioning of the whole Great Barrier Reef ecosystem. It provides connectivity between other habitats, from the coast to beyond the continental slope. Open water is dominated by microorganisms (plankton) and supports a range of other plants and animals such as invertebrates, fishes, reptiles and marine mammals.
Beds of *Halimeda* algae	Very Good	Stable	There is limited information on *Halimeda* banks. Given the habitat is remote and in deep water it is generally isolated from direct land-based impacts or development.

GRB wide attributes – Ecological and biological processes (Criterion (ix))	GBR Wide Condition	GBR Wide Trend	Significant contribution to OUV (with examples)
Other fauna, including microfauna	-	-	Little is known about most invertebrates. Changing environmental conditions in central and southern inshore areas, as well as some fishing activity, are likely to have affected invertebrates. Unlikely to be present in a manner that contributes to OUV.
Over 4000 species of molluscs and over 1500 species of fish, plus a great diversity of sponges, anemones, marine worms, crustaceans and many others	Good	Decline	Abundant biodiversity is present in association with coral reefs and other shallow water environments.
Important role of birds, such as the pied imperial pigeon, in processes such as seed dispersal and plant colonisation.	Poor	-	Islands and cays within the Great Barrier Reef support breeding populations of 20 seabird species. It is estimated that between 1.4 and 1.7 million seabirds breed throughout the Great Barrier Reef each year. This represents more than 25 per cent of Australia's tropical seabirds, more than 50 per cent of offshore–foraging black noddies and approximately 25 per cent of wedge-tailed shearwaters, brown and masked boobies and red-tailed tropic birds.224 The number of non-breeding birds (birds which use the Region for feeding but breed elsewhere) is estimated to be about 425,000, giving a total seabird population that may exceed two million. Key locations include wetlands, shorelines, offshore islands and coral cays. Pied imperial pigeon is found on offshore islands and the mainland of northern and north-eastern Australia. It is found in a variety of wooded habitats, such as mangroves, rain forest and in forests of Eucalyptus and Melaleuca. Island habitats provide a refuge for the species away from most human development.

TABLE 6: THE MOST IMPORTANT AND SIGNIFICANT NATURAL HABITATS FOR IN-SITU CONSERVATION OF BIOLOGICAL DIVERSITY, INCLUDING THOSE CONTAINING THREATENED SPECIES OF OUTSTANDING UNIVERSAL VALUE FROM THE POINT OF VIEW OF SCIENCE OR CONSERVATION (CRITERION X)

The following table identifies the key attributes that contribute to habitats for conservation of biodiversity (Criterion x) of the GBRWHA. The condition and trend for the attribute is taken from GBR Outlook Report 2014 – these are GBR wide ratings that provide context only. The final column provides examples or descriptions of when each attribute might be considered to be contributing to OUV.

GRB wide attributes – Habitats for conservation of biodiversity (Criterion (x))	GBR Wide Condition	GBR Wide Trend	Significant contribution to OUV (with examples)
Diversity supporting marine and terrestrial species (global conservation significance)	Good	Decline	See tables above.
Coral reefs (400 species of corals in 60 genera)	Poor	Decline	See tables above.
Diversity of mangroves	Good	Stable	See tables above.
Diversity of seagrass	Poor	Decline	See tables above.
Dugong	Poor	Decline	The Region is home to a globally significant population of dugongs and provides essential habitat and connectivity between populations in the Torres Strait and the waters off south-east Queensland. The Region's population is recognised as contributing to its outstanding universal value. Seagrass meadows provide the key habitat area, many of which are included in reserves and dugong protection areas.
Species of whales	Good	Improve	See above.
Species of dolphins	Good	Decline	There is estimated to be 18 species of dolphin throughout the GBRWHA, with some species solely inhabiting inshore waters and others typically being found far from the coast.

GRB wide attributes – Habitats for conservation of biodiversity (Criterion (x))	GBR Wide Condition	GBR Wide Trend	Significant contribution to OUV (with examples)
			It is estimated that there are less than 100 Australian snubfin dolphins in Cleveland–Halifax Bays and about 70 in Keppel Bay–Fitzroy River. An aggregation has also been recorded at Princess Charlotte Bay–Bathurst Bay on Cape York Peninsula. There have been population estimates for Indo-Pacific humpback dolphins in Cleveland Bay (50 or less); the Capricorn coast (about 64); Keppel Bay (about 107); and Port Curtis (about 85).
Humpback whale calving	Good	Improve	The humpback whale is continuing to recover strongly after being decimated by whaling. From an east Australian population as low as 500 animals when whaling ceased, numbers have grown consistently with an estimated annual recovery rate of between 10.5 and 12.3 per cent. The most recent 2010 survey provides no evidence that the rate of population growth is slowing significantly with an absolute population abundance in that year of over 14,500. Key locations include the Whitsunday Islands where calving occurs.
Marine turtles	Poor	-	See tables above.
Green turtle breeding	Poor	-	
Marine turtle rookeries			
242 species of birds	Poor	-	See tables above.
22 seabird species breeding (cays and some continental islands have globally significant breeding sites)	-	-	See tables above.
Plant species and diversity and endemism	Good	Decline	The region supports 1000s of species of plants, many of which are endemic to the region. Notable are the vast and diverse mainland mangrove forests and, in places, unique island vegetation.

4. EXPRESSION OF OUV

From the analysis undertaken it should be possible to identify those attributes that are contributing to each of the four (4) listing criteria in a manner that supports and validates the inclusion of the GBR on the World Heritage list.

Where the contribution is significant (i.e. unique, notable of ecological importance) it is reasonable to assume that the presence and function of that attribute is part of the OUV of the GBRWHA. Where the contribution is moderate or minor then the representation of OUV locally can be considered to be non-critical to maintaining the World Heritage values of the whole GBR.

Detailed below are the example results from the Port of Abbot Point (Adaptive Strategies 2015) to demonstrate how the OUV attributes for a particular area can be described using the methodology in this paper.

ABBOT POINT EXAMPLE

The evaluation of key attributes of the OUV of the GBRWHA expressed within the Abbot Point study area has determined that there is one attribute providing a significant contribution and a number of attributes providing a minor contribution to OUV in the study area. No attributes were found to have a moderate contribution within the study area. These attributes are summarised in Table 7.

Table 7: Example of OUV contributions from the Port of Abbot Point

Attribute	OUV Criteria contribution				Summary of contribution	Environmental value
	VII	VIII	IX	X		
Diversity supporting marine and terrestrial species (global conservation significance)	Sig			Sig	There is a significant contribution to OUV from migratory birds within the Caley Valley Wetlands, with important populations of four species occurring within the study area. The habitats of the wetland also support in excess of 15 species of migratory birds making it critical habitat (EPBC Act definition).	Important populations of Latham's Snipe; Red-necked Stint; Australian painted snipe and Sharp-tailed sandpiper occur within the wetland. A diverse range of other migratory bird species also occurs.
Marine turtles	Min			Min	There is a minor contribution to OUV from marine turtles, with low-level Green turtle breeding occurring on adjacent beaches.	Green turtles
Migrating whales	Min			Min	There is a minor contribution to OUV from migrating whales, with Humpback whales being sighted within the port area occasionally.	Humpback whales
Species of dolphin				Min	There is a minor contribution to OUV from inshore dolphins within the port area.	Indo-pacific humpback and Snubfin dolphins
Mangrove forests	Min			Min	There is a minor contribution to OUV from mangroves fringing the coast.	Various Mangrove sp.
Seagrass habitat				Min	There is a minor contribution to OUV from seagrass that has been recorded in the nearshore areas of the port.	Seagrass sp.

The findings indicate that the OUV of the GBRWHA is expressed at Abbot Point through the presence of important populations of shorebirds and minor occurrences of marine species and terrestrial and marine ecosystems.

5. LOCAL STATEMENT OF INTEGRITY

From the analysis undertaken to identify the attributes contributing to OUV it will now be possible to evaluate the wholeness and intactness of these attributes in order to prepare a 'Local Statement of Integrity' for the local area.

The Local Statement of Integrity should contain:

- Information on the Integrity of the wider GBR World Heritage Area– see retrospective Statement of OUV
- Contextual information on the relevant priority port in relation to the World Heritage listing of the GBR – includes establishment date, size, boundary implications, areas affected, changes in use
- Summary of the significant local contributions to OUV
- A brief commentary on whether the proposed master plan will lead to a loss or alteration to the Integrity of the World Heritage Area.

The Local Statement of Integrity should consider the definition, advice and criteria contained within the Operational Guidelines (UNESCO 2016) in combination with the outcomes of the OUV assessment and the proposed master planning outcomes. When considering integrity it is also important to benchmark the analysis in the context of the (retrospective) Statement of OUV at the time of listing, including the pre-existing condition and use of the local area. In the GBR the existing human activities: commercial, industrial, recreational and social; were all recognised at the time of listing. Management of these activities forms part of the ongoing operational aspects of the GBRWHA.

It is also worth noting that where a attribute is contributing significantly to OUV (i.e. unique, notable of ecological importance) it is reasonable to assume that the presence and function of that attribute is part of the integrity of the property in terms of relative intactness, wholeness and condition. Where the contribution is moderate or minor then the condition locally of that attribute can be considered to be less critical to maintaining integrity.

The following criteria and considerations are provided to help evaluate the information that will inform a Local Statement of Integrity.

Table 8: Considerations for developing a Local Statement of Integrity

UNESCO CRITERIA	CONSIDERATIONS
Includes all elements necessary to express its Outstanding Universal Value	– Will the relevant local area continue to support the significantly contributing attributes of OUV in a sustainable and representative manner? – Will the diversity of the WH property be altered or diminished? – Will the significantly contributing attributes be maintained and protected to ensure the property continues to represent high levels of biological diversity?
Is of adequate size to ensure the complete representation of the features and processes which convey the property's significance	– Is the overall size of the WH property being altered or changed in a material way? – Will the boundary of the WH property be altered as a result of proposed planning and development? – Will the overall significance of the property be altered in any way? – Will the overall size and ecosystem functions within the WH property be altered in any way?
Suffers from adverse effects of development and/or neglect	– Will proposed plans and development result in an unmanaged level of impact or neglect to the local attributes that significantly contribute to OUV? – Will significantly contributing attributes be maintained and managed? – Will any impacts to significantly contributing attributes of natural beauty be assessed, minimised and managed as development proceeds?

It is also important to note and understand that a port master plan does not alter the need to conduct detailed environmental impact assessment for any proposed development. Any development that may impact significantly on World Heritage values will be required to be assessed and approved by the Commonwealth Minister for the Environment under the *Environment Protection and Biodiversity Conservation Act 1999*. Impacts to the integrity of the World Heritage Area would form part of any such assessment.

6. FUTURE MANAGEMENT

The analysis should also contribute to an understanding of the management measures required to ensure that the attributes are managed alongside the ongoing development of a priority port. The result from an evaluation of the OUV of the GBRWHA at the local level can be fed into the evidence base and Environmental Management Frameworks for each priority port to enhance master planning outcomes.

7. REFERENCES

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