



# 2020-2025 DARWIN HARBOUR STRATEGY

A contemporary strategy for  
the sustainable management  
of the Darwin Harbour region

Darwin Harbour Advisory Committee



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Published July 2020 by the Darwin Harbour Advisory Committee.

ISBN 978-1-74350-214-3



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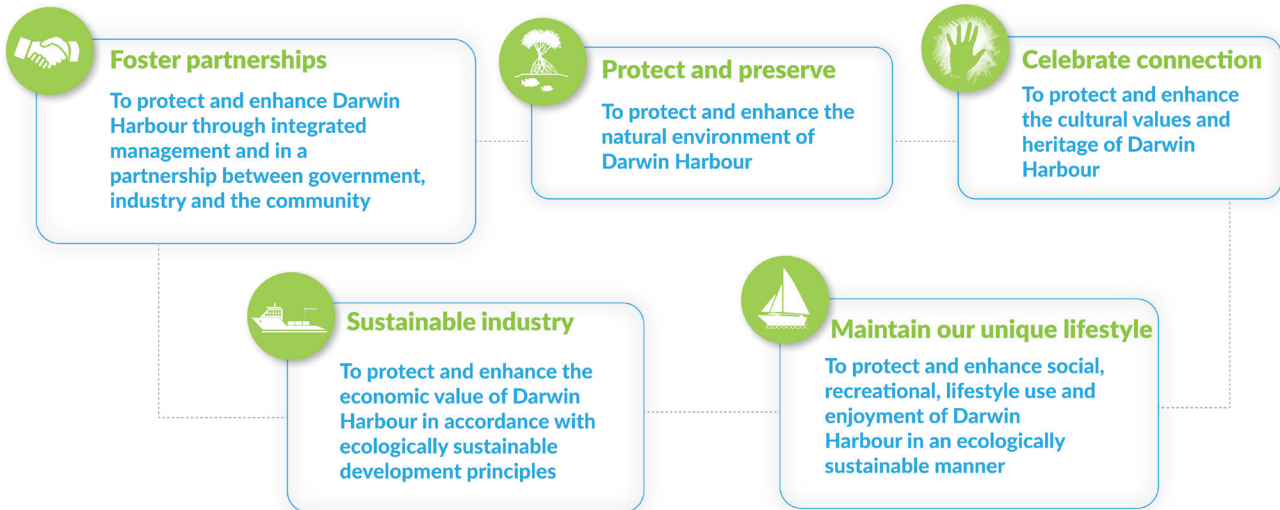
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# Message from the Chair

This Darwin Harbour Strategy document has been prepared by the Darwin Harbour Advisory Committee as a key reference document. The Strategy outlines principles, goals, objectives and outcomes to help guide sustainable management and planning in the region. This founding framework promotes ecologically sustainable development and fosters good stewardship of our beautiful harbour according to the espoused values.

The values and goals espoused in this document call on us to:



Darwin Harbour is a thriving tropical harbour, which is highly valued by the community for its significant natural, cultural and social values. As a working harbour it supports an important industry hub and is the gateway of Northern Australia, which presents a diversity of economic opportunities.

Our harbour and its catchment are currently in good condition, however, we all need to invest in maintaining and where appropriate improving condition so that our legacy is a healthy and productive harbour for future generations. Pressures associated with population growth and the developing industry base in the region compel us to ensure the environment and resources of the harbour are sustainably managed.

The best way to achieve the goals of the Strategy is through collaborative partnerships. The Committee is committed to facilitating this approach with the community, industry and governments.

The Committee continues to view the Strategy as a living document, and welcomes feedback from all users and stakeholders in the region. The continued support from the community is vital. It underpins the founding principles of this document and the approach to a sustainable future for our magnificent harbour.

Chair, Darwin Harbour Advisory Committee  
Professor Karen Gibb

## Section A: Introduction

Darwin Harbour has good ecological status but the pressures of economic growth and development require a pro-active approach to its management (Munksgaard et al., 2019). The Darwin Harbour Strategy 2020 - 2025 (the Strategy) recognises the community values of the region and articulates guiding principles to ensure these values are protected into the future.

The Strategy provides a robust vision for the Darwin Harbour region with clear guiding principles to underpin its stewardship. The Strategy outlines management goals, objectives and outcomes for Darwin Harbour to ensure the protection and enhancement of its environmental, economic, cultural and social values in the face of current and future challenges. The Strategy builds on the 2010 publication to ensure it is relevant to challenges facing the Darwin Harbour region.

The Strategy is designed to guide key stakeholders including government and non-government groups in future management of the Darwin Harbour region.

The Strategy is a guiding document which provides the framework under which actions to monitor, protect and facilitate sustainable development in Darwin Harbour will occur. It sets goals, key objectives and outcomes to achieve the vision for the Darwin Harbour. This will be supported by development of actions and priority projects.

### A1: Background

The Darwin Harbour Advisory Committee (DHAC) is a ministerial committee that provides advice to the Northern Territory Government through the Minister for Environment and Natural Resources on the effective management of Darwin Harbour. The development of the Strategy has been facilitated to ensure that current and future challenges and opportunities associated with the Darwin Harbour region are managed to ensure long-term sustainability.

The Darwin Harbour region encompasses the waters of Darwin Harbour and its catchment (Figure 1; hereinafter inclusively referred to as the Darwin Harbour), which extends from Charles Point in the west and Gunn Point in the east and to the south of Darwin River Dam to include waters of Shoal Bay, East Arm, Middle Arm, West Arm and their respective tributaries. The region is the Northern Territory's most densely populated area and supports the Territory's largest concentration of commerce and industry. Darwin Harbour is a working harbour with ongoing development and is recognised as playing a pivotal role in the economy of the Northern Territory.

The previous Darwin Harbour Strategy (2010) was developed as a guide to ensure the responsible stewardship and sustainable development of the Darwin Harbour.

It is important that this Strategy reflects current challenges and opportunities being experienced by the harbour and identifies appropriate mechanisms to monitor and effectively manage one of the Top End's most valuable resources, and align with, and draw upon, contemporary documents and information such as the Coastal and Marine Management Strategy, amongst other relevant literature.

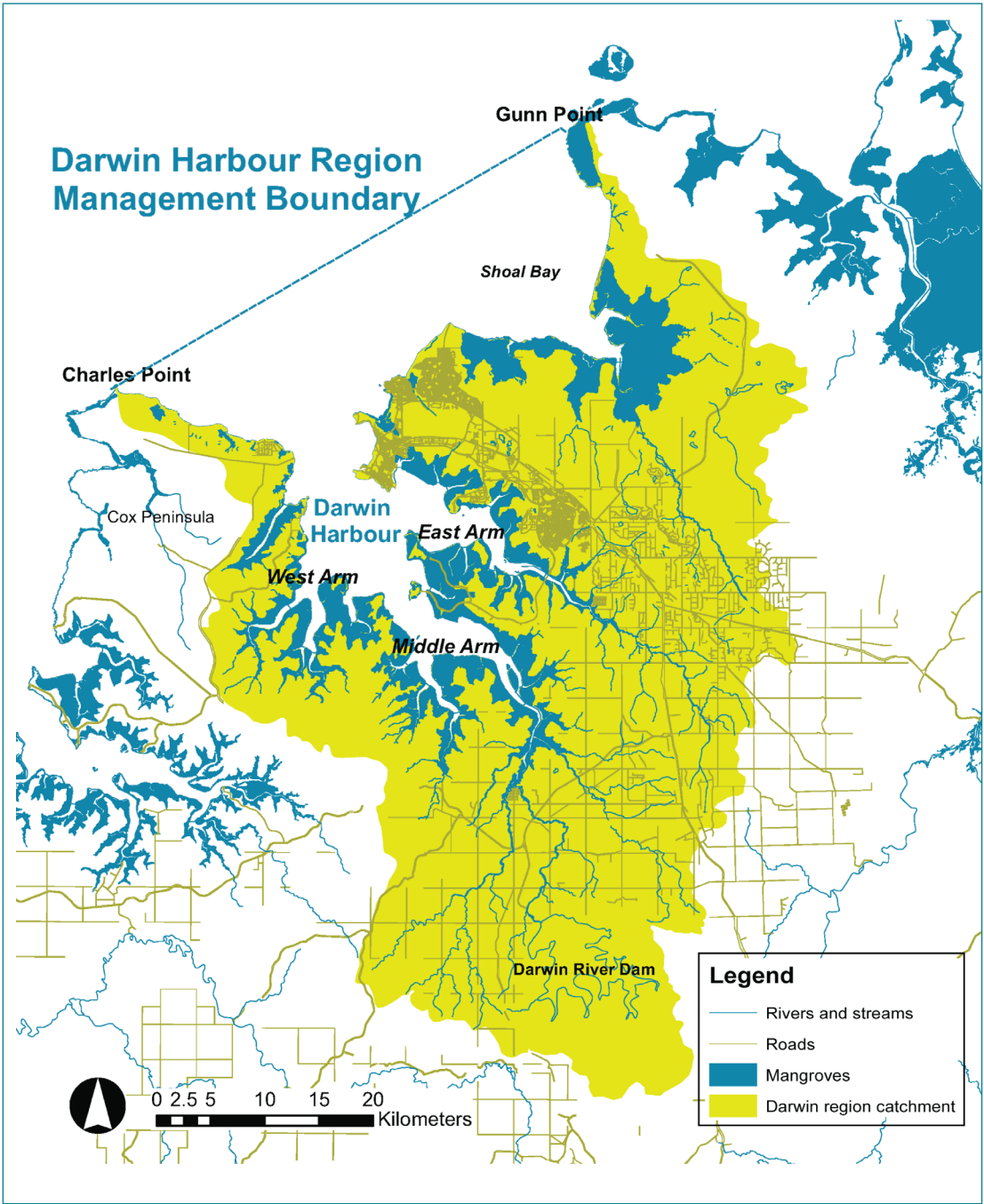


Figure 1. The Darwin Harbour and its catchment area.

## A2: Approach to developing the Strategy

The Strategy has been developed through a collaborative approach with stakeholders to ensure the protection of values and to encourage the strengthening of partnerships.

Collaboration to arrive at management goals and identification of actions and priority projects will facilitate the formation of an integrated management approach to ensure the protection and enhancement of Darwin Harbour.

The Strategy does not canvas individual potential development opportunities, but rather outlines a management approach to ensure the protection of Darwin Harbour in assessment of any future development.

The Strategy draws on key policy and previous documents and incorporates information from DHAC planning and development workshops, working group meetings and the review and synthesis of other relevant documentation (Figure 2).



Figure 2. Framework for development of the Strategy.

A key learning from previous strategic documents is that community values for Darwin Harbour remain unchanged. However each iteration shows a growing level of maturity in managing the challenges in the region and optimising opportunities. Certainly, the improved knowledge base and preservation of values through a progressive regulatory framework will support the aspirations of the Strategy and form an enduring foundation.

The Strategy is the first phase of a process which distills the vision and management goals. Figure 3 provides an outline of the process and clearly identifies the two main phases.

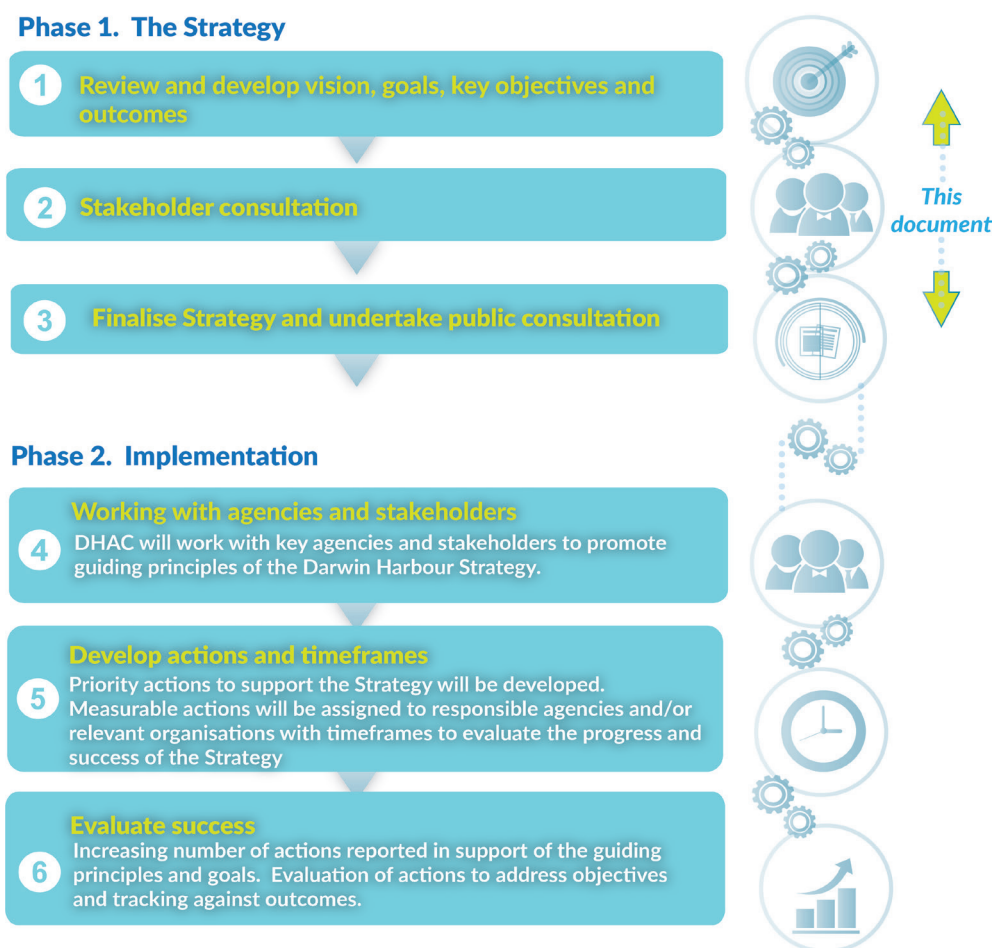


Figure 3. Phased approach to the development and implementation of the Darwin Harbour Strategy.

## Section B: Context

### B1: The Darwin Harbour region

Darwin Harbour is one of the least-disturbed working harbours in Australia and the Asia-Pacific region. The region's catchment extends from Charles Point in the west and Gunn Point in the east and covers approximately 3,230 km<sup>2</sup>. The area includes the tributaries and estuarine areas of Cox Peninsula, West Arm, Middle Arm, East Arm, Blackmore River and Howard River. Several major river systems drain to the estuary (Blackmore, Elizabeth and Howard) unlike other Australian cities which receive most of their catchment inflows from one large riverine system.

Darwin Harbour and its estuaries are fringed by extensive mangroves, mudflats, reefs and seagrasses and is home to animal life such as dolphins, dugong, sea turtles, shorebirds and a large variety of fish. The harbour is a tropical macro-tidal estuary with semi-diurnal tides which reach a maximum of close to 8 metres, producing strong tidal movements which transport sediment within and across the harbour's boundaries.

The harbour's catchment has a variety of ecosystems including extensive eucalypt forest and woodlands, riparian woodlands along rivers and creeks, and monsoon rainforests. These habitats support a rich biodiversity surrounding and interwoven, with the urban and rural zones of Darwin.

Darwin has a monsoonal climate that is characterised by a hot humid wet season (December to March), and a relatively cool to warm dry season (May to August). The average annual rainfall for Darwin is approximately 1,700 mm with nearly all of this falling between December and March.



Darwin Harbour is rich in natural and cultural heritage and is relatively pristine, making the region quite unique considering its proximity to a capital city.

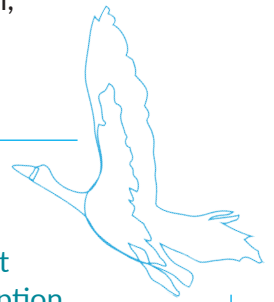
The coastal, riverine and terrestrial environments are prized for their significant cultural, social, environmental and economic value. The region also maintains the largest proportion of the Northern Territory's population and is the country of the Larrakia people. The Larrakia people maintain an innate connection to the land and sea in the region. Cultural, spiritual and heritage sites of significance are located throughout the region where traditional harvesting remains an important practice to the Larrakia people.

Darwin Harbour's proximity to the Asian region makes it an important hub for industry and trade where current development as a service centre for mining, defence and energy sectors is well advanced. This development will complement other activities such as tourism, horticulture, aquaculture and agriculture in the region. The harbour supports critical transport corridors and infrastructure that underpin the Territory's economy and services businesses of all sizes throughout the Territory and the broader Australian economy.

Development pressures present not only challenges, but an opportunity for Territorians to balance the protection of this natural asset whilst effectively utilising its resources and recognising its growing reputation as the gateway to Australia as well as the potential to develop the harbour as a tourism showpiece. Some of these potential challenges and opportunities are further explored in Appendix 1.

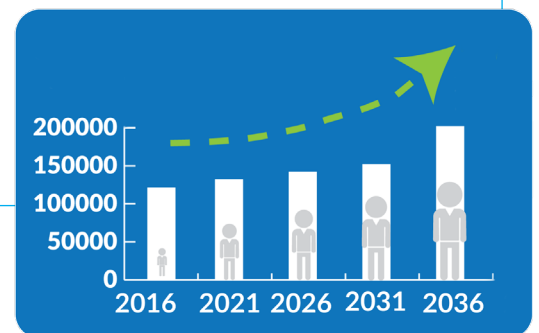
Managing impacts associated with urban and industrial development around our coastline and the harbour's catchment area, vegetation clearing, increasing pollutant inputs to receiving waterways, increased shipping use, and commercial developments within the harbour are just some of the pressures which will require a well informed and adaptive approach.

Notwithstanding these challenges Darwin Harbour is a unique asset, naturally intact and in good condition. We are in an ideal position to maintain this and set the scene for a vibrant and sustainable future. Maintaining a strong sense of community ownership is essential to this process and will continue to help drive the considered development of Darwin Harbour.



Larrakia people continue in their traditional use of natural resources in the Darwin Harbour region. In the recent past, Larrakia enjoyed everyday consumption of the bountiful food resources from the land and sea; bush tucker and medicine could be found everywhere, such as; mangrove worms (Darla), Long Bums (Danijarra), fish, mudcrabs, ducks, magpie geese (Gakingga), wallabies, possums, goannas and turtle eggs. (DHAC, 2003)

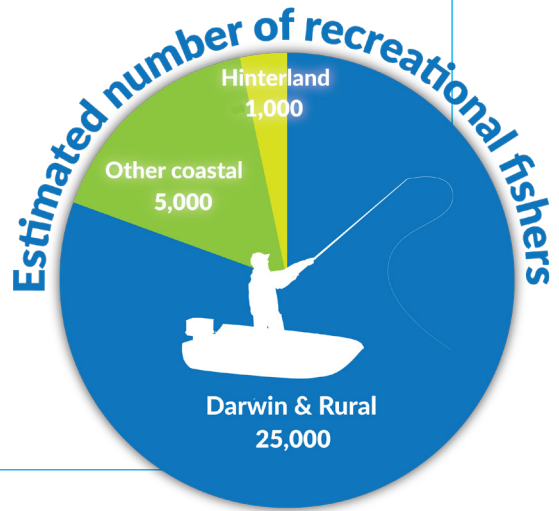
Population growth projection for the Greater Darwin region is forecast to increase from 130,000 people in 2016 to 169,000 in 2036. (Source: NT Department of Treasury and Finance, 2019).



Darwin Harbour provides a beautiful backdrop for the city of Darwin and surrounds and provides its residents and tourists with a variety of living and recreational options including sailing, boating, fishing and diving. Recreational fishing is an important part of the Northern Territory lifestyle, a major tourism drawcard and a significant contributor to the economy, with wide recognition as a large and growing industry.

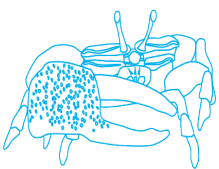
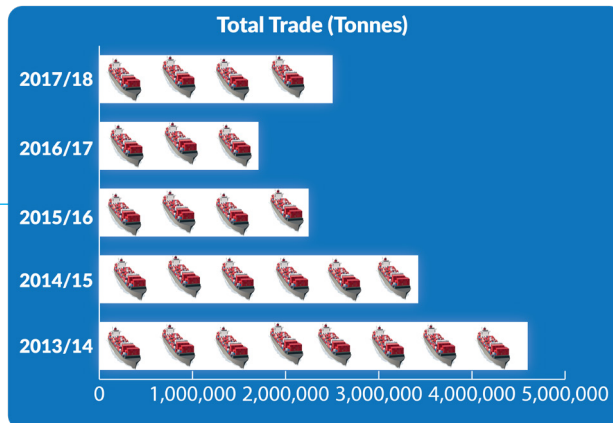
NT residents spend an estimated \$51 million on goods and services related to recreational fishing every year, of which \$47 million (92%) is directly attributable to recreational fishing—that’s an average of over \$1,500 per fisher.

Opportunity to further develop and promote Darwin Harbour as a tourism asset would benefit both local residents and tourists alike.

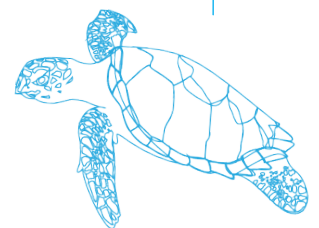


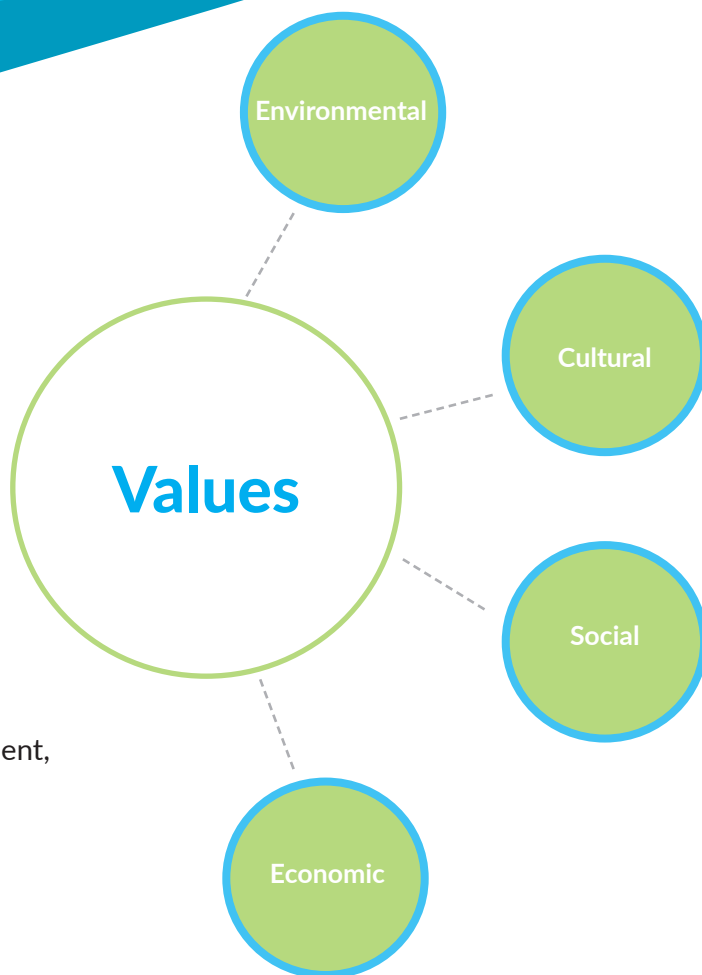
The Port of Darwin is Australia’s nearest port to Asia and the northern gateway for trade. It supports the offshore oil and gas fields in the Arafura Sea, Timor Sea and waters off the coast of Western Australia and provides service for international and domestic trading vessels, cruise ships, gas export, livestock export, defence, and dry and liquid bulk trades. These industries are pivotal

to the Northern Territory economy and in some instances provide critical resources for the Northern Territory.



The incredible value of the harbour's biodiversity is still being realised. Its flora, in particular mangroves and aquatic plants and internationally threatened or rare fauna (such as whales and dolphins, sea turtles, seahorses, dugong, fish, stingray, sharks, migratory birds) present immense biological and cultural value to the region. Exploring opportunities to maintain these iconic species through the combination of traditional knowledge systems and scientific approaches to conservation is important.





## B2: Purpose of the Strategy

The purpose of the Strategy is to provide guidance for the integrated management of the Darwin Harbour to promote ecologically sustainable development, foster good stewardship of our harbour and protect its environmental, cultural, social and economic values.

The Strategy's purpose is to:

- Provide policy and decision makers within government, industry, commerce and the community with a framework for the integrated management of the Darwin Harbour.
- Advocate a consistent, coordinated approach to stewardship and decision making related to resource use for the region, encourage stakeholders to work together and adapt their practices to ensure that values of the region are recognised and conserved for current and future generations.
- Acknowledge that all Territorians have a role in stewardship of the Darwin Harbour.
- Provide a shared vision for the harbour, as well as founding principles to underpin its stewardship. It contains goals, objectives and actions (Figure 4) that outline the management approach needed to maintain the harbour's environmental, cultural, social and economic values.
- Inform thinking and decision-making with regard to activities affecting the harbour.

The application of the guiding principles, goals and objectives is designed to:

- guide and inform policy and decision making by all tiers of government, community organisations, business and industry so that the values of Darwin Harbour can be best protected and enhanced<sup>1</sup> ; and
- establish a framework and set of actions that seek to protect and enhance the values of Darwin Harbour and create a sustaining model for its successful stewardship.

<sup>1</sup> Whilst the Strategy is intended to provide important guidance, it does not replace or duplicate other plans, policies or legislation. It should be read in conjunction with other Local, Northern Territory and Australian Government legislation and policies, to inform decision making and policy implementation.

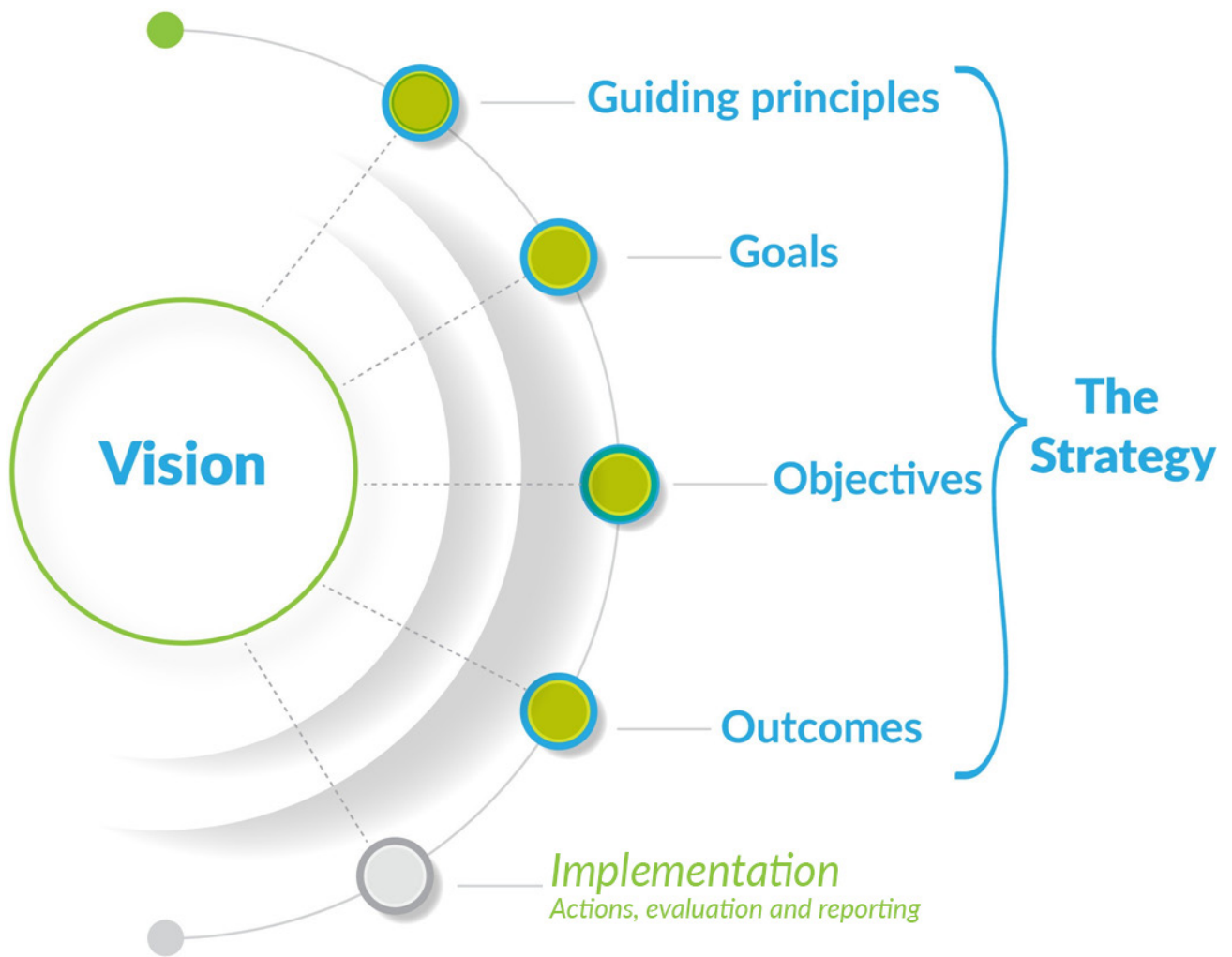


Figure 4. The structural hierarchy of the Strategy elements.



## Section C: Strategy Framework

### C1: Vision for Darwin Harbour

Integrated management and the protection of Darwin Harbour is the responsibility of everyone who interacts with the region. This includes people for whom the land is traditionally and culturally significant, those who seek recreational and social enjoyment and those for whom the harbour is a source of income.

The Strategy's stated vision captures this intent.

#### The vision

**To protect and enhance the environmental, economic, cultural and social values of Darwin Harbour.**

### C2: Guiding principles

The Darwin Harbour Strategy is supported by the following guiding principles which should underpin all decision-making processes and/or plans of action that could affect Darwin Harbour.

#### The principles:

1. The values of Darwin Harbour (environmental, cultural, social and economic) as outlined in the Strategy are protected and enhanced.
2. Ecologically Sustainable Development is fundamental to our livelihood, our economy, our culture and society, now and in the future.
3. Larrakia traditional ownership, obligations and cultural values are recognised.
4. Adoption of a partnership approach to management and stewardship that identifies common goals and operates in good faith for the Northern Territory.
5. Management must be integrative, adaptive and responsive now and for the future, taking into account the impacts of climate change.
6. Continual effort to enhance our knowledge and understanding to ensure that decisions can be based on the best available evidence-including scientific knowledge, traditional knowledge, and community knowledge.
7. Decision-making processes relevant to the use and development of the harbour and its catchment are evidence-based, responsive and proportional to identified risks, and sufficiently transparent to empower stakeholders and the local community to participate.
8. Policy settings and regulation must be supportive of the harbour's beneficial uses in a manner that achieves mutual and balanced recognition of economic, social, cultural and environmental considerations.
9. All beneficiaries of the social, economic, cultural and environmental values of the harbour should contribute to the protection and enhancement of these values.



### C3: Goals, objectives and outcomes

There are 5 equally important management goals that underpin the Strategy. These goals (Figure 5) are to be considered as part of decisions that are made, actions that are undertaken or uses proposed that could affect Darwin Harbour. Each goal is supported by key objectives and outcomes.

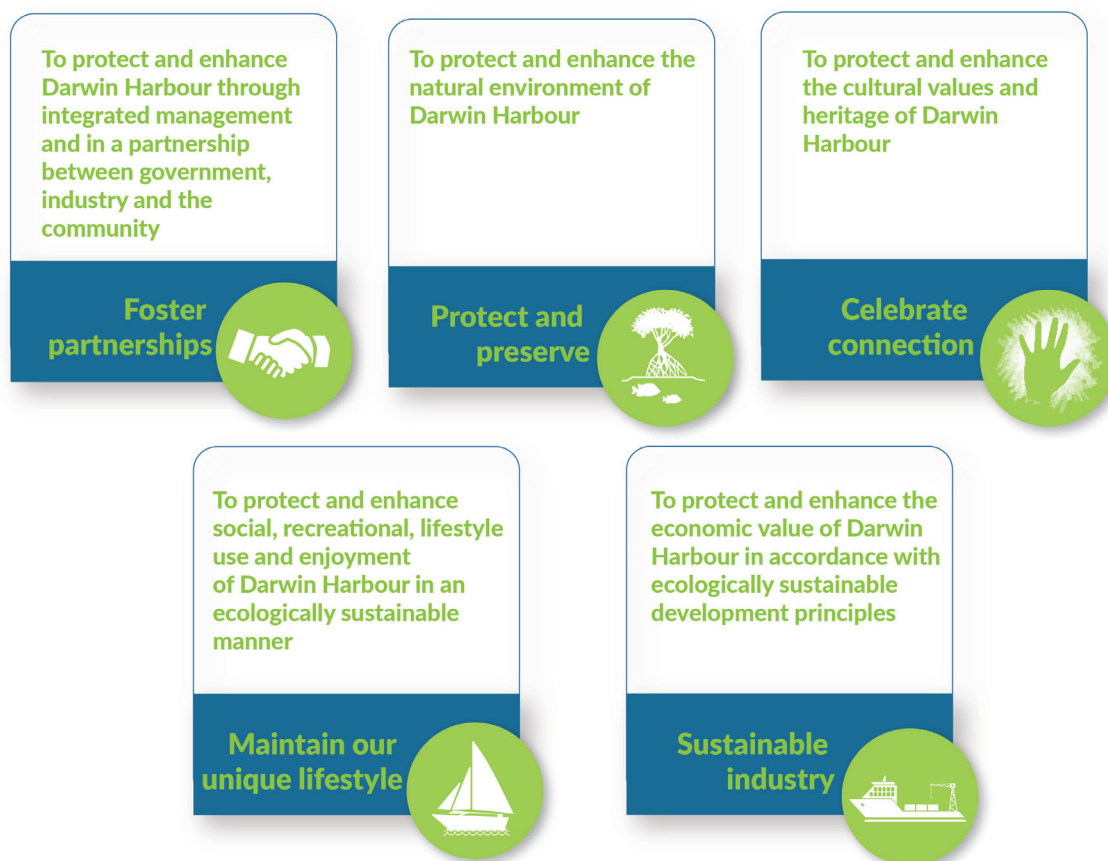


Figure 5. Goals of the Darwin Harbour Strategy.



**Foster partnerships: To protect and enhance Darwin Harbour through integrated management and in a partnership between government, industry and the community.**

### **Key objectives**

1. Management of the Darwin Harbour is based on best available science and knowledge including traditional, community and industry knowledge, and seeks innovative and sustainable solutions.
2. Key knowledge gaps are identified and prioritised for research focus.
3. Governments, non-government organisations, industry and local communities adopt a partnership approach to planning and managing the use of the Darwin Harbour – its environments and resources.
4. Active involvement of local communities in management and planning of the Darwin Harbour.
5. Researchers, academics, policy officers, managers and stakeholders work together to inform and improve policy, scientific understanding and management of the Darwin Harbour.

### **Outcomes**

- Knowledge and understanding of the region's environmental, social, cultural and economic values is expanded, shared and measured through collaborative and focused data gathering, analysis, mapping and integrated reporting.
- An engaged community aware of their stewardship to maintain the values of the region.
- Transparent decision-making processes are inclusive of stakeholders.
- Increased collaboration and cooperation across Northern Territory Government agencies, all levels of government, community organisations, research bodies, industry and the wider community.



## Protect and preserve: To protect and enhance the natural environment of Darwin Harbour

### Key objectives

1. Ecosystems of Darwin Harbour remain healthy, diverse and intact and maintain their functional importance.
2. Improve understanding of ecosystems and the services they provide and develop appropriate measures to inform decision-making regarding their conservation, sustainable use and development.
3. Manage to protect and improve resilience of the region so it is adaptive to climate change and natural events.
4. Potentially damaging impacts on the Darwin Harbour are assessed and managed according to the principles of Ecologically Sustainable Development.
5. Undertake a strategic environmental assessment of Darwin Harbour.

### Outcomes

- Aquatic ecosystems are intact and functional.
- Measures reflecting the health of Darwin Harbour's natural environment (e.g. air shed, flora, fauna and waterways) show improvement over the medium and long term with no lasting deterioration.
- Management strategies are adaptive in the face of a changing environment.
- Progressive regulatory regimes are in place that safeguard the environmental values of the Harbour.
- Understanding of the natural environment is improved through the strategic environmental assessment of Darwin Harbour.





## Celebrate connection: To protect and enhance the cultural values and heritage of Darwin Harbour

### Key objectives

1. Cultural and heritage sites are identified, documented, promoted and protected.
2. Connection to Darwin Harbour (sea country) by the Larrakia people is recognised, maintained and protected.
3. Traditional Owners can continue to sustainably utilise resources in the Darwin Harbour to maintain their cultural practices and lifestyle.
4. Increase community and visitor exposure, knowledge and understanding of the diverse cultural and heritage values of Darwin Harbour.

### Outcomes

- Darwin Harbour is celebrated for its rich cultural, spiritual and heritage values.
- Cultural and heritage sites are safeguarded for future generations.
- Community and visitors are aware and respectful of the cultural and heritage values of the harbour.
- Traditional Owners continue to sustainably utilise resources in the harbour to maintain their cultural practices and lifestyle.





## Maintain our unique lifestyle: To protect and enhance social, recreational and lifestyle use and enjoyment of Darwin Harbour in an ecologically sustainable manner

### Key objectives

1. Develop better understandings of the range of current and potential recreational and lifestyle uses of Darwin Harbour in order to improve policy formulation and implementation that meets community aspirations and appropriately manages impacts.
2. Enhance accessibility to diverse recreational and lifestyle uses of Darwin Harbour in safe and sustainable manner.
3. Maintain the diversity and sustainability of community, visitor, Traditional Owner, recreational and lifestyle uses.
4. Promote and celebrate the recreational and lifestyle uses in Darwin Harbour.

### Outcomes

- Knowledge of social and recreational use and impacts is improved.
- Recreational amenity protected, promoted and enjoyed by the community and visitors.
- Increased diversity and intensity of recreational and lifestyle uses is supported in a sustainable and informed manner.
- Sustainable harvesting and fishing activities maintained.
- The diverse aesthetic values of the harbour continue to be enjoyed by community and visitors.
- Darwin Harbour is widely recognised as a vital element in Darwin being a liveable and vibrant city providing quality choices where people want to live, play, work and visit.



**Sustainable industry:** To protect and enhance the economic values of Darwin Harbour in accordance with Ecologically Sustainable Development principles.

### Key objectives

1. Develop and implement policy and regulatory settings that support and enhance environmentally sustainable economic uses of Darwin Harbour.
2. Implement strategic land use planning within the Darwin Harbour to proactively protect and enhance the existing and future economic and commercial benefits.
3. Development approval processes are based on proportionate responses to identified environmental and social risks.
4. Aboriginal and local communities continue to derive economic and social benefits from sustainable business enterprises and/or industries in Darwin Harbour.

### Outcomes

- Darwin Harbour report card monitoring provides ongoing evidence that new economic development (land and aquatic based) in Darwin Harbour is ecologically sustainable. Spatial and land use planning protects both environmental and economics value of the harbour.
- Policy and regulatory settings recognise and protect important existing economic uses of the harbour, such as a transport and logistics node and a tourism precinct.
- Medium and long term growth in the harbour's contribution to positive economic outcomes for the Northern Territory.



## Section D: Where to from here – Implementing the Strategy

Activating the Darwin Harbour Strategy will rely upon government, industry and individuals across the region taking responsibility for their shared role in protecting the Darwin Harbour and committing to taking steps to advance the Strategy's management goals.

The Strategy represents the first component in a two-phased approach. The Phase 1 outcome was the revision and development of the Darwin Harbour Strategy including its vision, goals, key objectives and outcomes identified through consultation with stakeholders and the community. The outcome of this first phase is this document. The second phase is the development of actions and priority projects to implement these goals, key objectives and outcomes. It is proposed that identification and commencement of these actions and priority projects occur from 2020-21.

These actions and projects will complement a number of initiatives DHAC acknowledge have already been progressed by the Northern Territory Government. This includes commencement of the new Environment Protection legislation in June 2020 which introduces an improved and rigorous environmental impact assessment process and the requirement for an environmental approval, for projects which may have a significant impact on the Territory's environment. Additionally, the development of an offsets framework for the Northern Territory is a supporting regulatory tool that can assist in addressing residual impacts associated with development projects. Implementation of the Darwin Harbour Strategy's actions will also help to deliver aligned objectives of the Northern Territory Government's Coastal and Marine Management Strategy (2019-2029).

The Northern Territory Government will use this document to provide clear direction for those within government, and outside government, on the principles and management goals to be considered and addressed in any future planning, development and management actions relating to Darwin Harbour.

It should be noted that the implementation of principles such as Ecologically Sustainable Development require a whole-of-government approach. The Strategy seeks to encourage inter-agency collaboration, partnerships and stewardship by all management bodies in the recognition that advancing social, economic and environmental values is the charge of everyone.

Outcomes from the Strategy will be reviewed and reported on annually, including those actions and priority projects successfully developed and implemented, against the goals and objectives of the Strategy.

## Appendix 1. Potential challenges and opportunities

There is an increasing intensity and diversity of uses of Darwin Harbour for social, cultural, recreational and economic purposes. The adequacy of policy and regulatory systems to appropriately protect and enhance each of the harbour's beneficial uses in a balanced and integrated manner without compromising these values remains a major challenge.

The challenges facing the Darwin region are not unique to developing cities. Future management and development of the Darwin Harbour will give consideration to other harbours with similar operating environments and learn lessons from others to avoid and manage risks to our environment. The current excellent condition of our harbour is a considerable advantage.

### Climate change –adaptation to sea level rise

Sea level rise occurs at a faster rate in Darwin Harbour, with an estimated 6mm per year (Webb and Hennessy, 2015), than other parts of Australia, and could have a wide impact across the coastal zone. Based on 3 years of data (2014 to 2017), these sea level rise rates exceed the sediment accumulation rates in seaward edge mangroves in Darwin Harbour. This monitoring has highlighted the potential for some of these valuable coastal assets to be submerged and lost. An ongoing commitment to monitoring which integrates a measure of sea-level rise to inform adaptive planning is essential.

While natural events such as cyclones are outside our control we can manage the risks and impacts to our coastlines from rising sea levels, flooding or storm surge through monitoring our coastline and river systems and by strategically planning our city, its infrastructure and the surrounding catchment.

### Use of natural resources

The Darwin Harbour is highly regarded for its environments and high biodiversity value (Munksgaard et al., 2019; DHAC 2003). The region continues to supply freshwater for domestic, industry uses and sustains flows which support ecosystems, recreational fishing and harvesting practices. Government regulates the allocation of water resources to maintain ecosystems and land clearing guidelines aim to minimise habitat loss. Increasing demand on land and water resources and reaching the right balance of allocation is a challenge as the region develops.

Estuarine ecosystems are closely linked to their river catchments through the input of freshwater and changes to flow regimes from over extraction can affect connectivity and may alter the physical and chemical environment for biota affecting processes such as spawning, reproduction, migration (including mangroves) and production.

Other potential pressures such as unmanaged over fishing, removal of biota, increased shipping or dredging activities can impact marine biota movement or their use of harbour which can reduce and/or disrupt natural population dynamics and have a broader impact on the harbour's ecology.

### Mangrove forest

Mapping in 2018 shows that 269ha or 1.3% of mangroves have been cleared for infrastructure development since 1996 and 51ha (0.3%) of salt flat/samphire. These diverse communities fringe our coastal zone buffering storm surge and effects of cyclones, provide habitat for marine and terrestrial fauna, process nutrients and serve as effective carbon stores and sink for sediments. Modification and reclamation of inter-tidal habitats (notably mangroves) and their riparian areas places increasing pressure on the coastal zone. Unmanaged development which impinges on our coastline can alter harbour hydrodynamics and sediment transport, result in water pollution (notably acidification) by disturbance of sediments and consequently modify local ecology. Understanding the pressures on, and resilience of, mangrove zones and preserving their important ecosystem function is a major management challenge for coastal planning and development.

## Urban development and growing population

The continued population growth and sprawl from high density to low density rural areas results in land degradation through building roads and infrastructure. This can fragment land and encroach on threatened habitats, species and waterways. Urban development in the Darwin region covers approximately 30% of the catchment with growth in the northern suburbs and the Palmerston area experiencing notable expansion in the last 10 years. Urban development displaces the natural environment increasing impervious surfaces and stormwater which conveys entrained pollutants. This diffuse input can impact water quality and aquatic health of receiving waterways. To manage these challenges a strategic approach to land use and planning of our built environment is essential in concert with habitat and wildlife conservation efforts.

As the Darwin region's population grows, an additional challenge is to manage community expectations for access to services and social infrastructure.

Increasing urbanisation will need to accommodate the population without impacting recreational and aesthetic values.

Demand for waste services and treatment place additional pressure on infrastructure, landfill and receiving waterways subject to licenced waste discharge. There are good opportunities to plan strategically to support sustainable communities, whilst grasping opportunities for improved environmental, social, cultural and economic outcomes and minimising potential negative impacts of urbanisation. These can include the adoption of approaches such as water sensitive urban design (WSUD).

## Waste

Over-consumption of natural resources and the huge volumes of waste especially plastics, have become a global crisis. Waste products end up in landfills, beaches, rivers and our oceans. As with any growing city, the management of waste streams presents an ongoing challenge.

Working with industry partners to improve environmental management practices including the regulation of waste material is part of the mix of action required to deal with increasing impacts associated with waste in our environment.

Industry, government and community stewardship is an important underpinning basis for action coupled with enforcement and regulation. Recycling centres, re-use or treatment operations including biofuel are often seen as market driven decisions for private operators. However smart cities create opportunities and incentivise creative solutions for waste treatment, and this can generate an entirely new industry that in turn broadens our economy.

## Cumulative impacts

Increasingly we are forced to confront cumulative impacts and pressures that may interact and cause additive or antagonistic outcomes far greater than the outputs generated by each industry alone. Understanding the nature of these other interactions is essential if we are to manage these threats – and often this will require basic research that will inform management to avoid or mitigate before the damage is done.

Ideally, under a framework of cumulative impact assessment, a proposed development would be considered in the context of previous impacts, ecosystem resilience and recovery rates, other potential developments in the broad surrounds and broad-scale impacts of the activity itself. Challenges to this approach are not only administrative, but also scientific. The impact of multiple interacting pressures is an inherently difficult field of research. While significant, increasing understanding informed by new collaborative monitoring and research effort is underway, there are still gaps in our knowledge. In particular our understanding of the complex biodiversity and ecosystems within the harbour and consequent limits to our ability to accurately assess impacts and measure changes in the harbour's health are a significant challenge.

Currently the treatment of cumulative impacts is not well developed or addressed specifically by legislation for planning and development. However current legislative reforms for environment protection will provide recognition of cumulative impacts and strategic assessments. Effective cumulative impact management will require the development of approaches to facilitate sophisticated, sensible and respectful interactions between managers, researchers, government, industry and communities.

## Appendix 2: Glossary

### Cultural

The way of life, especially the general customs and beliefs, of a particular group of people at a particular time. This includes behaviour and habits, their attitudes toward each other, and their moral and/or religious beliefs.

### Development

For the purpose of the Darwin Harbour Strategy, the term development refers generally to planned or ongoing activities associated with commercial, industrial and residential growth. For example, the Waterfront Development, new housing estates and the LNG plants at Wickham Point and Bladin Point.

DHAC also recognises the broader definition of development as “improvement in a country’s economic and social conditions”. In this context, development refers to efforts that seek to improve the economic wellbeing and quality of life for a community by creating or retaining jobs and supporting or growing incomes and the tax base. A wide variety of indicators, including literacy rates, life expectancy, poverty, safe, resilient and sustainable cities amongst others may be used to measure the impacts of development (United Nations, 2018).

More recently, the triple bottom line approach has been used to assess the impacts of development on economic, social and environmental values which seeks to promote the integration of the three components. This approach is gaining recognition as a framework for conceptualising and measuring development. In the Northern Territory there is also a significant focus on cultural values, which are accounted for in this Strategy.

### Environment

All aspects of the surroundings of man including the physical, biological, economic, cultural and social aspects. For the natural environment this means the air, water, and land in or on which people, animals, and plants live.

### Ecologically Sustainable Development

Using, conserving and enhancing the community’s resources so that ecological processes, on which life depends, are maintained, and the total quality of life now and in the future can be increased (Council Of Australian Governments, 1992). This definition is based on National Strategy for Ecologically Sustainable Development which has been adopted by the Northern Territory Environment Protection Authority in how it assesses impacts in the Northern Territory.

The following principles as outlined by the *Northern Territory Environment Protection Act 2019*, are supported by the Strategy:

- decision-making principle, where processes should effectively integrate long-term, short-term and equitable considerations
- precautionary principle, careful evaluation to avoid serious or irreversible damage to the environment wherever practicable and where a lack of full scientific certainty should not be used as a reason for postponing measures to prevent degradation
- evidence-based decision making, where decisions should be based on the best available evidence in the circumstances that is relevant and reliable
- intergenerational equity, where the present generation should ensure the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations



- sustainable use, in that natural resources should be used in a manner that is sustainable, rational, wise and appropriate
- conservation of biological diversity and ecological integrity, and
- improved valuation, pricing and incentive, where environmental factors should be included in the valuation of assets and services.

### **Ecosystem-based management**

The 2005 Scientific Consensus Statement on Marine Ecosystems-based Management (Communications Partnership for Science and the Sea) states:

“The goal of ecosystem based management is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need. Ecosystem-based management differs from current approaches that usually focus on a single species, sector, activity or concern; it considers the cumulative impacts of different sectors.”

### **Planning**

The Northern Territory Department of Infrastructure, Planning and Logistics (DIPL) develops land use policies and strategic plans in consultation with the community. DIPL also manages the planning and development framework incorporating the *Planning Act 1999*, the Northern Territory Planning Scheme, and it provides professional and technical support to the Development Consent Authority.

All planning processes and zoning maps can be found on DIPL’s website under the NT Lands Group link at <https://nt.gov.au/property/building-and-development/nt-planning-scheme/northern-territory-planning-scheme>

### **Recreational**

An activity or something done for pleasure or to relax, or such activities may include fishing, walking, swimming, boating, picnicking etc.

### **Strategic planning**

Strategic planning is the shaping of land use and development plans to match broad, long-term objectives and achieve planned outcomes within a given timeframe. In some organisations corporate plans and strategic plans may be included in one document. Strategic planning in terms of land use/development planning seeks to order and regulate the use of land in an efficient and ethical way. Strategic planning incorporates the scientific, aesthetic, and orderly disposition of land, resources, facilities and services with a view to securing the physical, economic and social efficiency, health and wellbeing of urban and rural communities.

### **Stewardship**

Stewardship is an ethic that embodies the responsible planning and management of resources. Stewardship refers to responsible use and protection of the natural environment through conservation and sustainable practices which can be practiced by all sectors government, industry and the community. The concepts of stewardship can be applied to the environment and nature, economics, health, property, information and theology amongst others.

### **Water Sensitive Urban Design (WSUD)**

WSUD is an approach to urban planning and design philosophy, which aims to overcome some of the deficiencies associated with conventional developments. This is achieved by integrating the total water cycle into new urban development and redevelopment areas from the strategic planning phase through to the design and construction phase (Taylor and Weber, 2004). WSUD promotes an approach to urban development that responds to a site’s natural features, protects natural ecosystems on site and downstream, and optimises the use of water as a precious resource. WSUD aids in the smart planning of urban spaces and infrastructure, and emphasises the importance of onsite collection, treatment and utilisation of water flows, including stormwater.

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