

# Norfolk Island Environment Strategy 2018–2023

*Norf'k Ailen Riigenl Kaunsl Enwairanment Straeteji*



*De wieh wi luk aut fe auwas said  
The way we look after our place*

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## Executive Summary

To ensure a sustainable environment for future generations, the Norfolk Island Environment Strategy has been developed for the Norfolk Island Community. This Plan complements the strategic plans under the Integrated Planning and Reporting Framework for Norfolk Island, to meet the operational target to develop an Environment Strategy, and to provide a monitoring and reporting framework for State of the Environment Reporting required under the *NSW Local Government Act 1993 (NSW) (NI)*.

Extensive reviews of existing plans, strategies, guidelines and statutory documents, in conjunction with stakeholder and community consultation were undertaken in the development of this Strategy. There was a high level of community response to the consultation, with over 200 community members engaged through a survey, workshops and community information pop-ups. A majority of people in the community indicated they were highly committed to preserving a healthy environment on Norfolk Island and identified that it was very important that the island is an environmentally sustainable community.

During consultation it was evident that all environmental themes were important to the community, however, the key themes included waste management, water quality, population and biosecurity. The actions of this Environment Strategy draw on the aspirations of the community and provide Council with tangible actions to implement in Council's operational planning.

Resourcing is a key limitation in implementing the Environment Strategy. One of the most common issues raised in submissions received when the draft Environment Strategy was placed on public display was that Council needs qualified environmental staff, particularly for essential works in the reserves and for the management of pests and weeds. Limitations apply not only to resourcing Council's small environment section, but also to Council's ability to access external grant funding. To address this resourcing issue, the Strategy actions focus on collaboration and community participation wherever possible.

The Environment Strategy is a living document and can be updated as new actions are developed, or actions within the Strategy are achieved. The Environment Strategy actions have been prioritised, including detailing the timeframe in which each action should commence.

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# 1 Introduction

The Norfolk Island Environment Strategy (Environment Strategy) was prepared for Norfolk Island Regional Council (Council) to support the achievement of outcomes of Strategic Direction 1: An Environmentally Sustainable Community, of the 'Norfolk Island Community Strategic Plan 2016–2026 – Our Plan for the Future' (Norfolk Island Regional Council, 2016). The Environment Strategy was prepared in consultation and collaboration with a broad cross section of the Norfolk Island community and government stakeholders. During preparation of the Environment Strategy, information has also been drawn from relevant reports, assessments, plans and surveys that have been prepared previously in relation to a range of environmental issues on Norfolk Island.

## 1.1 The environment of Norfolk Island

The Norfolk Island Group (Norfolk Island, Phillip Island and Nepean Island), as shown in **Figure 1**, is a relatively remote set of oceanic islands located in the Pacific Ocean, approximately 1400 km from the Eastern Seaboard of Australia and 800 km from the nearest land mass. Norfolk Island has an area of around 3855 ha, with the smaller Phillip and Nepean Islands being 190 ha and 10 ha respectively. **Figure 1** is an aerial photograph of Norfolk Island, and the nearby Phillip and Nepean Islands (the 'Norfolk Island Group').

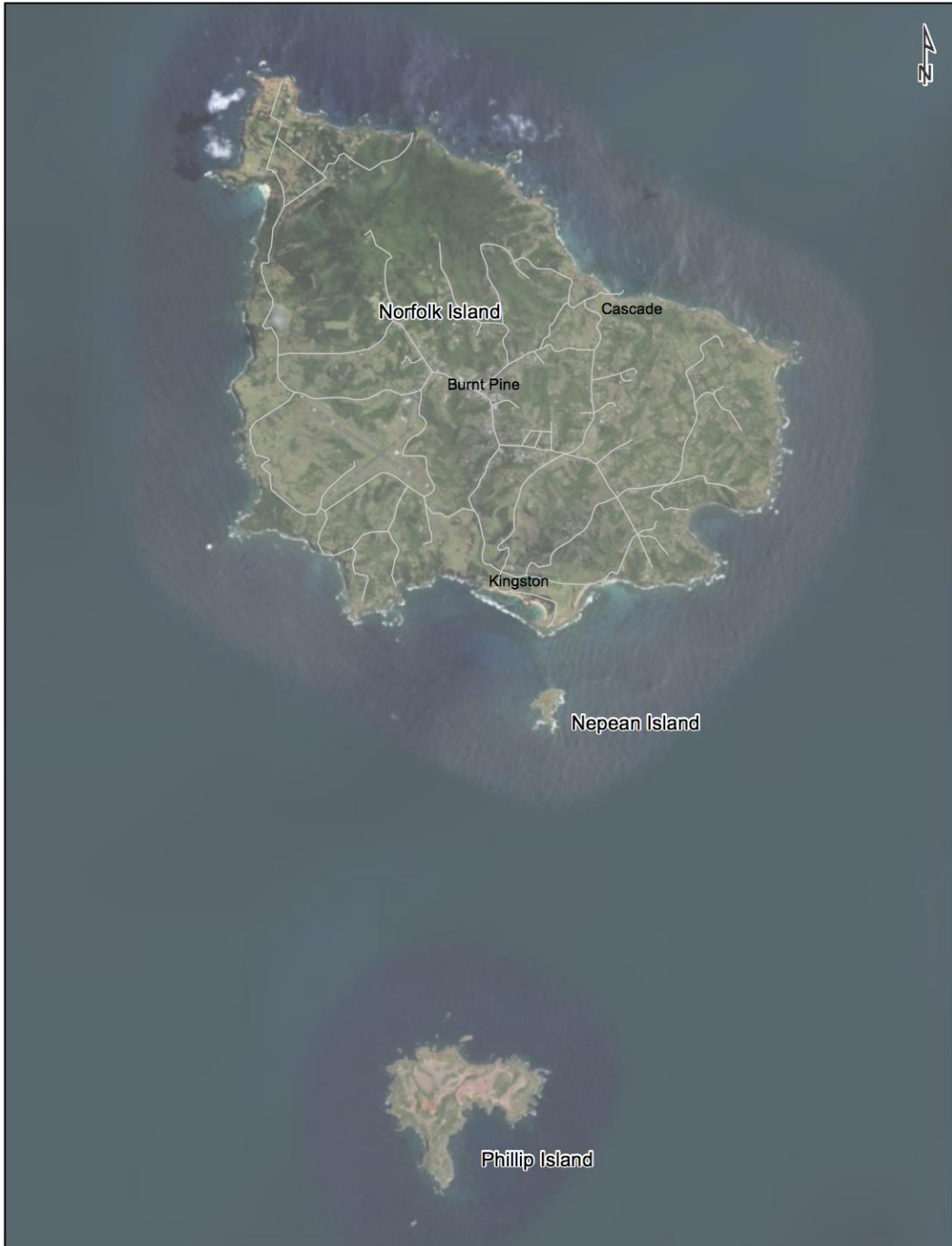
Norfolk Island is a mountain top remnant of an elongated shield volcano and consists primarily of a large elevated plateau, formed from horizontal sheets of basalt.

The climate is moderated by the ocean, with average temperatures of 13–19 degrees Celsius in winter and 18–25 degrees Celsius in summer. Annual rainfall averages 1312 mm with most rain received in the winter.

The first known human activity on the island was by Polynesians who colonised the island more than 1000 years ago, bringing with them the Polynesian rat (*Rattus exulans*) and some edible plants. When Capitan Cook arrived in 1774, Norfolk Island was uninhabited and covered by dense forest. The British set up two penal colonies between 1788 and 1855. The island is perhaps most famous for its connection to the Bounty Mutiny. In 1856, the entire population of Pitcairn Island, home to the descendants of the mutineers, relocated to Norfolk Island. Many of residents today can still trace their ancestry back to those original settlers. Currently, Norfolk Island has a population of around 1800 people with up to 30 000 visitors each year.

Like other oceanic islands, Norfolk Island's flora and fauna feature a high proportion of endemic species (i.e. those unique to Norfolk Island). This includes 43 plants (almost one quarter of the native flora), 15 birds (species and subspecies), and an unknown number of invertebrates. Since the arrival of humans, clearing for agriculture, timber harvesting, cattle grazing and for development has led to the fragmentation and loss of the majority of the native vegetation on the island. In addition, there have been changes to other environmental factors such as hydrology, marine ecosystems and landform.

The future of Norfolk Island is directly linked to the sustainable use and preservation of the Island's natural resources. The Norfolk Island community is committed to this, listing 'An Environmentally Sustainable Community' as the first of six Strategic Directions in the Community Strategic Plan 2016–2026.



Norfolk Island Environment Strategy 3001329

**The Norfolk Island Group**

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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**Figure 1: Norfolk Island Group**



## 2 Resourcing and implementing the Environment Strategy

During the consultation and development of the Environment Strategy, a key theme that emerged was the lack of resources within the environment division of Council to deliver the environmental objectives of the Community Strategic Plan 2016–2026. The Environment Strategy poses a further layer of pressure on resources to deliver on the Environment Strategy. Council recognises the limitations with resourcing within the environment section of Council, with the Workforce Management Plan 2016–2020, version 1, June 2018 stating, *‘specific challenges in the Waste and Environment section will need to be addressed in line with further legislative changes, in line with the development and recommendations of the Environment Strategy, Pest and Weeds Management Plan, and the imminent changes in the operation at the waste management centre.’*

A further limitation to delivering on the actions within this Strategy is the limited access to grant funding opportunities for Council. Under the current governance arrangements, Norfolk Island is not considered part of any particular State or Territory of Australia, making the island ineligible for State or Territory funding grants. Norfolk Island is, therefore, constrained in accessing funding programs specifically developed to assist Councils to respond and deliver on key environmental actions. Council has limited ability to generate a strong surplus budget from its operations due to a number of factors including the small ratepayer base, the high cost of living, its remote location and the limited growth and development on the island. Therefore, a number of actions are designed to address how the island can better access funding.

Council may have the opportunity to reprioritise existing resourcing, or to use this Strategy to demonstrate that additional funding is essential under Commonwealth Government funding such as the Financial Assistance Grant to Local Government program. It is critical that Council’s environment section is suitably resourced to deliver the actions within the Strategy.

In addition to adequate resourcing, the success of the Strategy is contingent upon the incorporation of the Strategy’s actions into Council’s operational work. To this end, the actions have been prioritised under each Tactic. This will allow actions to be implemented in the Delivery Program and Operational Plan and if necessary seek external funding. **Table 1** is a key to the Action Priorities that are presented in Sections 5 and 6.

**Table 1: Key to Action Priorities**

Priority Description	Priority Rank	Timeframe
Action is of a very high priority and should be commenced within one year of Council adoption of this Environment Strategy. Priority 1 actions are essential to achieving Strategy Objectives. These actions may be achievable within a short time frame with minor costs required.	<b>Priority 1</b>	<b>Commence within 1 year</b>
Action is of a high priority and should be commenced within two to three years of Council adoption of this Environment Strategy. Priority 2 actions are necessary to achieving the Strategy Objectives.	<b>Priority 2</b>	<b>Commence in 2 to 3 years</b>
Action is required and should be commenced within three to five years of Council adoption of this Environment Strategy. Priority 3 actions will contribute to ongoing progress toward achieving the Strategy Objectives.	<b>Priority 3</b>	<b>Commence in 3 to 5 years</b>

### 3 Why the Environment Strategy was developed

The Norfolk Island Community Strategic Plan 2016–2026 (CSP) was adopted by Council in September 2016. It identifies the main priorities and goals of the Norfolk Island Community for ten years, including the development of an Environment Strategy. Council’s Operational Plan 2018–2019 also includes a target to develop an Environment Strategy. Council must give the Norfolk Island community regular progress reports on the CSP, including in Council’s Annual Report.

The *Local Government Act 1993* (NSW)(NI) as amended now applies to Norfolk Island. The Act requires that Council produce a State of the Environment Report in the year in which an ordinary election of Councillors is held. This is generally every four years. The Environment Strategy is needed to set down a framework for State of the Environment Reporting, which must address the environmental objectives in the CSP. State of the Environment Reporting must establish environmental indicators that show progress towards these objectives.

#### 3.1 Integrated Planning and Reporting Framework

Council must comply with the Integrated Planning and Reporting requirements set out in Section 406 of the *Local Government Act 1993* (NSW)(NI). Council’s Strategic Framework for Integrated Planning and Reporting includes the overarching CSP and the Environment Strategy as one of five strategies that support the CSP, as shown in **Figure 2**.

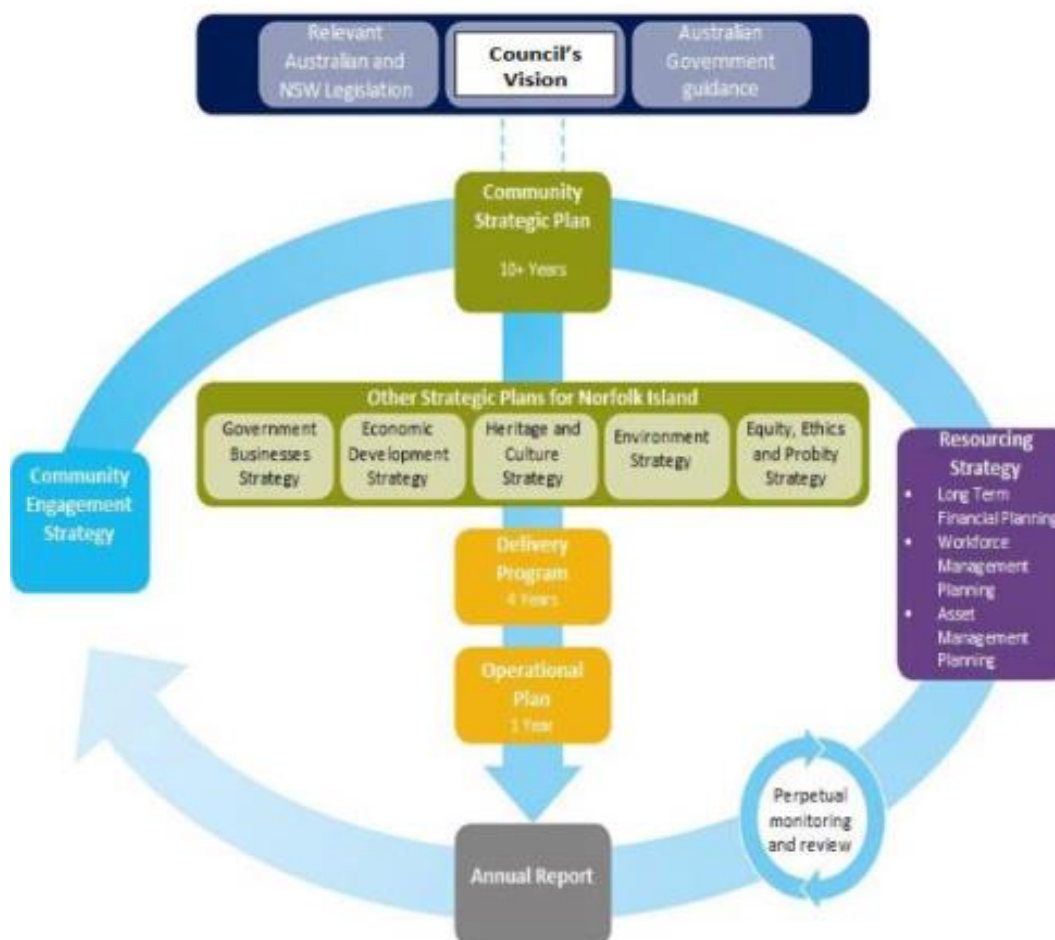


Figure 2: The Integrated Planning and Reporting Framework for Norfolk Island

### 3.2 Community Strategic Plan 2016–2026

The Norfolk Island Community Strategic Plan 2016–2026 (the ‘CSP’) identifies the main priorities and goals of the Norfolk Island community. It was developed with community consultation including numerous workshops, focus groups, surveys and community meetings. The people of Norfolk Island demonstrated a strong commitment to protect and manage the environment. Therefore, of the CSP’s six Strategic Directions, ‘An environmentally sustainable community’ was placed at the top of the list. **Table 2** shows the CSP Objectives and ‘How we will get there’ statements (or ‘Tactics’) that will guide Norfolk Island towards becoming ‘An Environmentally Sustainable Community’.

**Table 2: Community Strategic Plan Environment Strategic Direction and Objectives**

<b>Strategic Direction 1 An environmentally sustainable community</b>	
<b>Objective 1</b>	<b>Use and manage our resources wisely</b>
<b>How we will get there (Tactics)</b>	1.1 Develop a clean energy future 1.2 Protect and enhance our water quality 1.3 Reduce, reuse and recover waste and end disposal of waste into the sea 1.4 Plan for additional pressures on water resources, transport, utilities and telecommunications infrastructure 1.5 Create a food secure community 1.6 Create a water secure future 1.7 Keep our waters around Norfolk Island sustainable for the enjoyment of future generations
<b>Objective 2</b>	<b>Preserve a healthy environment</b>
<b>How we will get there (Tactics)</b>	2.1 Retain open spaces and low-density development 2.2 Recognise growth of the population is linked to the long-term environmental sustainability of the Norfolk Island community 2.3 Protect and preserve environmentally sensitive areas and those of high conservation value, through improved land management and pest control practices 2.4 Support threatened species and minimise the presence of invasive species 2.5 Ensure a healthy, diverse marine ecosystem 2.6 Protect and preserve vegetation communities and habitat

### 3.3 State of the Environment Reporting

The *Local Government Act 1993* (NSW)(NI) requires that Council produce regular State of the Environment Reports (‘SOE Reports’). SOE Reports for Norfolk Island must relate to Community Strategic Plan Objective 1 (Use and manage our resources wisely) and Objective 2 (Preserve a healthy environment), which are known as the ‘environmental objectives’. Sub-section 428A(3) of the *Local Government Act 1993* (NSW)(NI) stipulates that the State of the Environment Report is to:

- (a) establish relevant environmental indicators for each environmental objective, and*
- (b) report on, and update trends in, each such environmental indicator, and*
- (c) identify all major environmental impacts (being events and activities that have a major impact on environmental objectives).*

The Environment Strategy includes a framework for Council to prepare SOE reports. Therefore, the Strategy must determine the appropriate indicators for the environmental objectives. It will also need to stipulate how these indicators can be monitored and measured such that Council can identify environmental trends and any major environmental impacts. Baseline information is required for rigorous environmental measuring and monitoring programs. The Environment Strategy identifies and recommends environmental measuring and monitoring programs where this baseline information is available. Where the baseline information is not currently available the Environment Strategy recommends that this data be collected.

### 3.4 Progress reporting on the Environment Strategy

Progress reporting is used to inform future planning and is a key part of the Integrated Planning and Reporting framework. **Table 3** shows the progress reporting required under the Framework.

**Table 3: Environment Strategy reporting requirements**

Progress Report	Reporting Frequency	Reporting Relevance to Environment Strategy
Annual Report	Within 5 months of the end of each financial year (i.e. by 30 November)	Reports on the achievements in implementing the Delivery Program and achieving the objectives in the CSP over the previous year. The report must be prepared in accordance with the <i>Local Government Regulation 2005 (NSW)(NI)</i> and the Integrated Planning and Reporting Guidelines.
State of the Environment Report	Included in annual report due 30 November in year in which an ordinary election is held	Reports on environmental issues relevant to the objectives for the environment established by the CSP. The report must be prepared in accordance with the Integrated Planning and Reporting Guidelines and State of the Environment Reporting requirements.
'End of Term' Report	Tabled at the last meeting of the outgoing Council and included in the Annual Report due by 30 November of the year in which an ordinary election is held	Reports on Council's progress in implementing the CSP over the previous four years. The report must document outcomes, i.e. what have been the results for the community and Council as a result of the activities undertaken during the previous Term of Office.
Progress Reports on Delivery Program	Every six months	Report on progress with respect to the implementation of recommendations extracted from the Environment Strategy and included in the Delivery Program.
Operational Plan	Updated annually	Report on progress with respect to the implementation of recommendations from the Environment Strategy that have been included in the Operational Plan.

### 3.5 Legislative framework

Norfolk Island is in a unique situation legislatively in that it operates under a combination of Norfolk Island, Federal and applied NSW State legislation. This is due to the transition from self-government to a regional council, which commenced on 1 July 2016.

#### 3.5.1 Federal legislation in Norfolk Island

The *Norfolk Island Act 1979 (Cth)* and sub-ordinate regulations still apply to Norfolk Island. Significant changes were made to the *Norfolk Island Act 1979 (Cth)* in 2015. These changes came into effect through the *Norfolk Island Legislation Amendment Act 2015 (Cth)*. The Federal Minister has the power

to make Ordinances and Instruments for Norfolk Island. The *Norfolk Island Act 1979* (Cth) states that unless otherwise specified Federal legislation extends to Norfolk Island.

From 1 July 2016 Commonwealth taxation, social security, immigration, biosecurity, customs and health arrangements, including Medicare and the Pharmaceutical Benefits Scheme, were extended to Norfolk Island. The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) has been in force on Norfolk Island since 1999. The EPBC Act is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places — defined in the EPBC Act as matters of national environmental significance (MNES). MNES that are triggered on Norfolk Island include:

- world heritage properties
- nationally threatened species and ecological communities
- migratory species
- Commonwealth marine areas.

The EPBC Act requires that an action that has the potential to significantly impact a MNES, must be assessed for referral to the Australian Government Department of Environment and Energy.

### **3.5.2 NSW legislation in Norfolk Island (applied law)**

It is planned that NSW laws and regulations be applied to Norfolk Island as subordinate Commonwealth Legislation using the *Norfolk Island Applied Laws Ordinance 2016* (Cth). The Ordinance also allows the Federal Minister to repeal or make changes to any New South Wales legislation before or after it is applied to Norfolk Island. While some State legislation has already been applied to Norfolk Island, the operation of most NSW laws has been suspended until 2021 (Hutchinson, 2018).

NSW laws that apply to Norfolk Island and are relevant to the preparation of the Environment Strategy include the *Local Government Act 1993* (NSW)(NI), which provides the Framework for Strategic Planning (Chapter 13, Part 2, Sections 402–406) and Integrated Planning and Reporting by Councils. The *Local Government Act 1993* (NSW)(NI) also provides specific requirements for State of the Environment reporting (Section 428A).

### **3.5.3 Norfolk Island legislation**

There are many Norfolk Island Acts and associated Regulations relevant to the Environment Strategy including the following: *Bores and Wells Act 1996*, *Environment Act 1990*, *Noxious Weeds Act 1916*, *Norfolk Island Heritage Act 2002*, *Norfolk Island Plan 2002*, *Planning Act 2002*, *Public Reserves Act 1997*, *Subdivision Act 2002*, *Trees Act 1997*, *Waste Management Act 2003*, *Public Health Act 1996*, *Stock Diseases Act 1936*, *Migratory Birds Act 1980*, *Animals (Importation) Act 1983* and the *Electricity Supply Act 1985*. These are discussed throughout the Environment Strategy where relevant.

## 4 Consultation and public display

### 4.1 How we did the initial community consultation

Consultation activities were conducted on the island at various locations between 29 May and 2 June 2018. To maximise exposure and participation, a combination of qualitative and quantitative methods were chosen including:

- Community survey: both qualitative and quantitative data was collected around each of the Objectives of the CSP and corresponding tactics.
- Three community workshops: provided the opportunity for discussion and captured quantitative and qualitative data.
- Three information pop-ups at Foodland Mall: enabled people to provide views and ask questions around the Environment Strategy.

All community members were invited to participate and contribute to the development of the Environment Strategy. Consultation activities were promoted within the community and with key stakeholders in the following ways:

- community newsletter – 960 copies delivered via post to residents
- media release – advertised in the *Norfolk Islander* and *Norfolk Online News*
- radio announcement – prior to and during the consultation activities
- Council website – information at <http://www.norfolkisland.gov.nf/>
- local school – the Principal of Norfolk Island Central School was contacted and advised of the opportunity for participation.

### 4.2 What the community said

More than 200 people participated in one or more of the consultation activities. Input across all events varied regarding issues spoken about, attitudes expressed, and specificity of the solutions raised. On the whole, participants supported addressing specific environmental issues on the Island, and some recurring, consistent and dominant ideas emerged from the community, which are summarised below:

- Norfolk Island has a unique environment that must be looked after. The land and waters not only provide a range of environmental services to the island, but also have significant cultural, social and economic value to the community. These resources must be preserved and protected from overdevelopment, overconsumption, erosion, contamination and invasive species.
- Norfolk Island faces the challenge of being a small, isolated island with finite resources. Access to other resources is also made more difficult by its isolated location. Given this, the island needs to acknowledge and work within these constraints to become more self-sufficient and sustainable. Across services like waste and energy, there is support for the development of systems that reuse and recycle materials. Affirmative environmental action and becoming more sustainable is necessary to secure the future of Norfolk Island.
- The number of residents and visitors on Norfolk Island are strong determinants of how the island's resources are managed and consumed. The island can only support a limited population before pressure on environmental services and resources becomes too high. Better planning around development, infrastructure and utilities is necessary to ensure Norfolk Island's environment is safeguarded.
- Waste management on the island needs to be improved immediately. The burning of waste, either as backyard burning or burning for disposal at sea, is unsustainable and has

detrimental impacts on the environment, water quality and human health. The island needs to develop a better system where less waste is produced on the island and recycling or reusing is enhanced; and the accessibility and processes of the current Waste Management Centre need to be improved.

- As part of becoming more sustainable, importation of certain goods to Norfolk Island should discontinue. Importation of fruits and vegetables undermines the effort of becoming more self-sufficient in food security as it creates reliance on outside goods and carries the risk of introduction of new pests and diseases, which could threaten local food production. Importation of non-food items, such as packages and vehicles, also produces a substantial volume of waste that places pressure on the island's waste management services.
- Norfolk Island's environment has been impacted by introduced plant and animals species. A greater focus on biosecurity management is needed to ensure pests do not continue to negatively impact the island's unique ecosystems. Importation of fruits and vegetables should be stopped or its processes improved as importation contributes to the biosecurity risk.
- Alternatives to diesel energy are needed. Adopting renewable energy sources like solar and hydropower is favourable as they are better for the environment and can be incorporated into a closed energy system to facilitate the island becoming more sustainable.
- An effective environmental strategy will look inwards at Norfolk Island, and the needs of the community. It should support local industry and businesses, engage with the resident population in decision-making processes and support local knowledge and practices.
- Council needs to demonstrate strong leadership, maintain communications with the local population, provide economic incentives to implement change and educate the community.
- Change must happen now to ensure quality of life and quality of the environment are maintained for future generations.

Consultation with the community on Norfolk Island has extracted these themes as the most relevant concerns and issues they would like to see addressed through the Environment Strategy and State of the Environment Reporting. Together, they form a narrative about the issues affecting the island in becoming an environmentally sustainable community.

### **4.3 Stakeholder consultation**

In addition to the community consultation, consultation was conducted with the following stakeholders:

- Department of Environment and Energy (Parks Australia – National Parks and Marine Reserves)
- Department of Agriculture and Water Resources
- Department of Infrastructure, Regional Development and Cities
- key scientists who have undertaken environmental related studies on Norfolk Island
- Norfolk Island Regional Council (General Manager, Senior Strategic Planner, Health and Water Officer)
- Norfolk Island Regional Council (Mayor and Councillors)
- Office of the Administrator of Norfolk Island
- Kingston and Arthur's Vale Historic Area (KAVHA) Commonwealth Heritage Manager
- EcoNorfolk
- Hydro Tasmania
- Invasive Species Council
- Southwest Pacific Island Conservation
- Newcastle University

- Norfolk Island Cattle Owner’s Association
- Norfolk Island Flora and Fauna Society
- Accommodation and Tourism Association
- Chamber of Commerce
- Mental Health Awareness Group
- Transition Town
- Council of Elders
- Timber on the Move
- private individuals.

The stakeholder consultation was conducted through either teleconference or face-to-face meetings during the period 21 May to 15 June. Information discussed during these meetings has been used to inform the development of the Environment Strategy and is referenced in the Strategy.

#### **4.4 Public display of the draft Environment Strategy**

A draft Environment Strategy was compiled and presented to Council in September 2018. Council resolved to place the document on public exhibition from 19 September until 18 October 2018. To give the community an overview of the draft Environment Strategy, a public meeting was convened on 10 October 2018, and 38 people attended this meeting.

Eight written submissions were received during the public display period, and this feedback was used to finalise the Norfolk Island Environment Strategy 2018–2023. The four most common issues raised in submissions were:

1. Reward conservation on private land as part of ‘landscape level’ restoration. e.g. financial help (tax or land rates concessions), grant writing and practical assistance; not just words of encouragement
2. Council needs qualified environmental staff, particularly for essential works in the reserves and management of pests and weeds
3. Native and threatened plants need to be available to the public to allow us to restore land and to plant timber trees
4. We need a landscape level plan for restoration with baseline measurements (e.g. mapping of existing vegetation), targets and goals, and methods to undertake weeding, cattle management and erosion control, etc.

In addition to the above, a number of differing issues relating to biosecurity and how this impacts on the environment, primary production and human health were raised in separate submissions. Other submissions included specialist feedback and highly relevant reference materials. Amendments were made to the draft document to reflect this valuable feedback from the Norfolk Island community. The document was then finalised for presentation to Council in November 2018.



## 5 Objective 1: Use and Manage our Resources Wisely

Norfolk Island's resources include marine and fresh water, rock, sand, timber, energy and a host of other natural environmental resources. These resources need to be used and managed wisely because there are limited cost-effective alternatives and some resources are finite.

Norfolk Island's remote location drives the community to develop innovative ways to use and conserve the resources that are available on the island. This was evident in the solution-focused feedback received from the community during consultation on the Environment Strategy.

Seven tactics for using and managing resources wisely were developed in consultation with the Norfolk Island community in 2016 and documented in the Community Strategic Plan. They are presented in **Table 4**.

**Table 4: Tactics to achieve Objective 1**

<b>OBJECTIVE 1: Use and manage our resources wisely</b>
<b>1.1 Develop a clean energy future</b>
<b>1.2 Protect and enhance our water quality</b>
<b>1.3 Reduce, reuse and recover waste and end disposal of waste into the sea</b>
<b>1.4 Plan for additional pressures on water resources, transport, utilities and telecommunications infrastructure</b>
<b>1.5 Create a food secure community</b>
<b>1.6 Create a water secure future</b>
<b>1.7 Keep our waters around Norfolk Island sustainable for the enjoyment of future generations</b>

Tactics 1.1 to 1.7 have been further developed in the Environment Strategy, and actions have been listed to achieve them. These actions have been developed based on community consultation and reviews of existing research and other background information, listed in the References at the end of this document.

There are some issues such as land and soil contamination, and cattle grazing that are important to achieving Objectives 1 and 2. However, these issues do not align with the existing Tactics from the Community Strategic Plan. Therefore, they have been included in **Section 6.7: Additional Tactics to achieve Objectives 1 and 2**.

## 5.1 Tactic 1.1 Develop a clean energy future

### 5.1.1 Current situation

Key energy infrastructure on Norfolk Island currently includes an island-wide electricity network (diesel generators and individual solar hot water systems and solar power systems) and fuel storage tanks at Ball Bay where diesel, petrol, LPG and other fuels are delivered by tanker.

Electricity supply and distribution is an operational function of the Norfolk Island Regional Council. This contrasts with much of NSW, where power supply would generally be a State Government function (Parliament of NSW, 2018). The island recently invested in three new diesel generators, installed in 2018. Council staff maintain the diesel generators and electricity distribution network according to management plans and work schedules.

According to the Norfolk Island Economic Development Strategy (Department of Infrastructure and Regional Development, July 2015), the cost of electricity to businesses and households on Norfolk Island is currently almost four times more expensive than on the Australian mainland. This has a direct financial impact on the community and many people limit their energy usage by reducing energy consumption and/or increasing energy efficiency. Refrigeration systems have been highlighted as the single biggest user of electricity on the island (Lenzen, 2008).

Prior to 2013, a subsidised solar power program resulted in many businesses and individuals installing solar power systems that are connected to the grid and feed excess energy back into the system (Parkinson, 2017). As there is no central battery storage, excess electricity generated from solar power systems has to be dispersed using a heater bank at peak solar generation times. The grid is unable to handle additional power generated, as the diesel generators need to operate at a minimum of 30 per cent capacity (Parkinson, 2017).

Norfolk Island does not have access to alternative power sources if the system fails. Therefore, the electricity generation and distribution network must be reliable and able to be maintained locally. The cost of electricity is important to the community, but the reliability of the system is paramount.

Hydro Tasmania was engaged by Council in 2018 to develop an energy policy and technical design solutions for power generation on Norfolk Island. Hydro Tasmania is looking at current power generation systems and will make recommendations for improvements to technology currently in use and for use of new renewable technologies including:

- solar connection regulations (including feed-in tariffs)
- battery storage
- equitable access to solar power installation
- automation of the power station
- network stability and reliability.

Hydro Tasmania has developed three renewable energy configuration options for more detailed technical modelling and analysis. All of the options aim to deliver an increase in the contribution of renewable energy sources to the island's electricity generation, and to decrease demand for diesel fuel. On 27 July 2018, Council selected Option 3: Near Term Solar and Storage. This option was chosen due to the shorter time frame for implementation, lower capital costs and modular infrastructure that

may allow elements of the other options to be implemented. These options would achieve higher fuel savings and/or take advantage of technological advancement (Norfolk Island Regional Council, 2018g).

### 5.1.2 Action Plan for Tactic 1.1: Develop a clean energy future

Prioritised actions to address Tactic 1.1 are provided in **Table 5**. It is anticipated that a number of actions for to support a clean energy future will come directly from the Energy Policy currently being developed by Hydro Tasmania.

**Table 5: Action Plan: Develop a clean energy future**

Ref	Item	Action	Priority
1.1a	Education	Provide public education on electricity and incentives for energy efficiency. For example, the use of electrical appliances such as washing machines will use solar electricity on a sunny day, but will call on diesel power during the night.	Priority 1

## 5.2 Tactic 1.2 Protect and enhance our water quality

### 5.2.1 Introduction

Fresh water used on Norfolk Island includes rainwater, bore water and surface water. Water quality varies and local people take this into account when using the water for drinking, agriculture or industrial applications.

#### 5.2.1.1 Groundwater

Groundwater aquifers and a large, sub-surface freshwater lens (a convex-shaped layer of fresh groundwater that floats above the denser saltwater) are thought to hold the majority of the island's freshwater (Diatloff, 2007).

There are two 'types' of groundwater aquifers known to occur on the island – shallow and deep. Shallow groundwater aquifers sit within the weathered mantle layer, typically on high-lying land. During periods of drought, these aquifers tend to dry up due to extraction and natural drainage (Mosley, 2001). Deep groundwater aquifers sit within the bedrock and are estimated to attract 20 to 30 per cent of the island's total rainfall runoff, which reaches the aquifers through fractures in the weathered mantle (Diatloff, 2007; Parsons Brinckerhoff, 2008). The main source of recharge for the island's groundwater resources is runoff from Mount Pitt and Mount Bates.

Groundwater is used to supplement the island's rainwater and surface water supply. As shown in **Figure 3**, there are many groundwater bores across the island. Some of these have been found to be contaminated, while others are dry or leaking. A moratorium on new bores has been in place since 1994 (Parsons Brinckerhoff, 2008).

#### 5.2.1.2 Surface water

The island plateaus generally comprise dry valleys which lead into perennial and intermittent streams, which then discharge into one of the island's few primary creeks. Most streams are only active in the wetter winter months and are dry, or reduced to localised pools, in the drier summer months.

Monitoring of surface water has indicated the presence of faecal coliforms, nitrates, viruses, chloride, ammonia, phosphates, heavy metals and pesticides above recommended guideline values (GHD, 2016b; Wilson, 2017).

The Norfolk Island Water Quality and Sewerage Infrastructure Management Strategy (ANI, 2014) identifies nutrient-laden surface water and catchment management issues as factors contributing to poor surface water quality. For example:

- The current catchment management techniques contribute to the degradation of water quality through stormwater runoff, which then impacts the near shore ocean water quality.
- *Escherichia coli* (E. coli) levels increase after rainfall and after significant disturbance to creeks.
- Dredging has been previously used to open the flow through the Kingston wetland. The use of dredging for maintenance of wetlands is discouraged in best practice surface water management.

To address these issues, stormwater runoff needs to be better managed across the island, and discharge of wastewater from sewage infrastructure needs to be reduced. In addition, the use of

dredging for maintenance of wetland drainage must only be conducted provided it meets best practice surface water management.

Parsons Brinckerhoff (2005) outlines that the majority of Norfolk Island soils are well drained, clay-based soils with high plasticity. This makes them vulnerable to slippage. Such slippage can lead to sedimentation and subsequent impacts on surface water quality particularly following vegetation clearing.

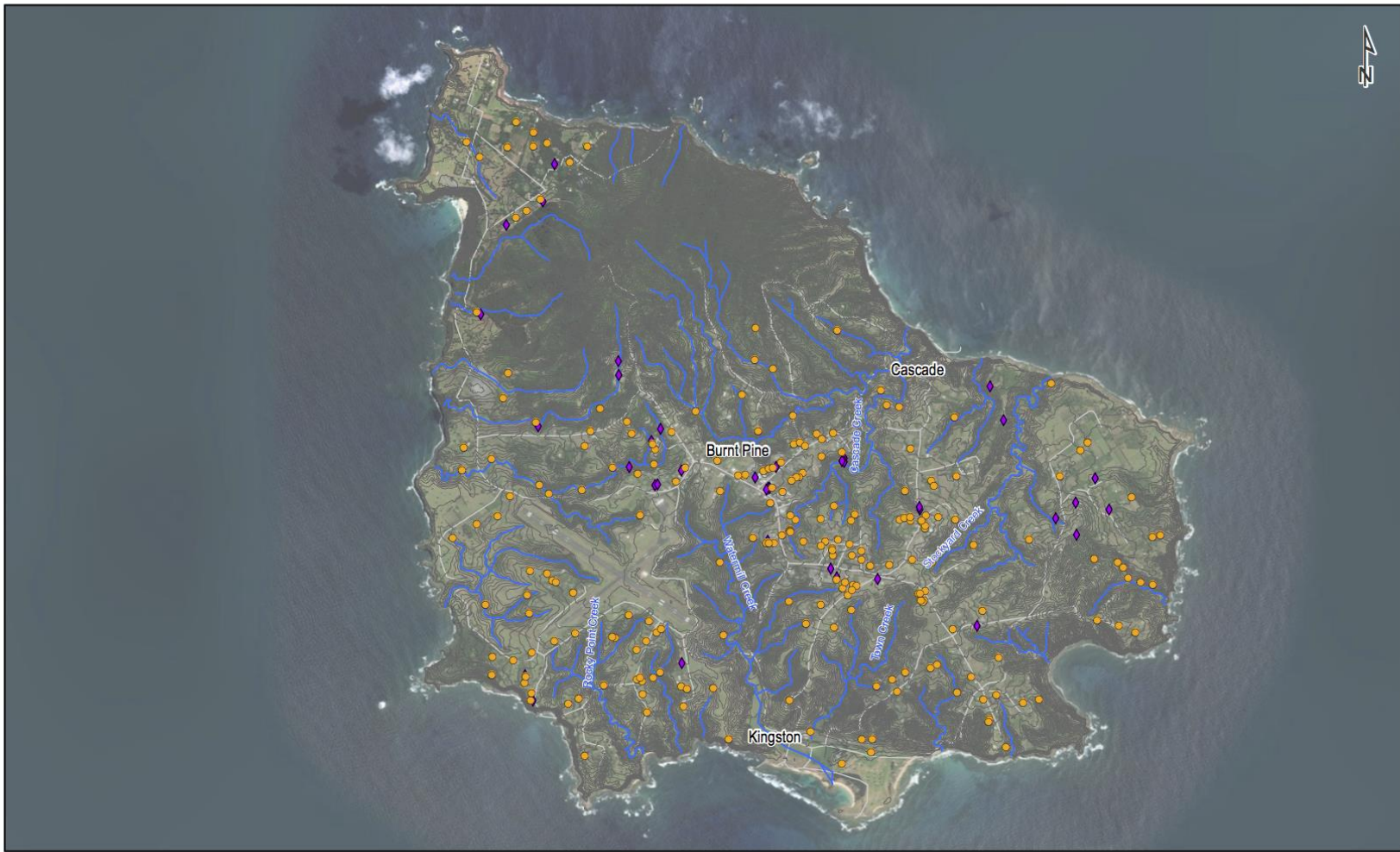
Erosion control of exposed and degraded land, due to rural land uses, such as farming and cattle grazing, can improve surface water quality. Norfolk Island's soil type is suitable for the implementation of erosion control, such as infiltration systems and Water Sensitive Urban Design (WSUD).

#### 5.2.1.3 Marine Water

The marine waters surrounding Norfolk Island, known as the Norfolk Marine Park, are managed under the Temperate East Marine Parks Reserves Network Management Plan as of 1 July 2018. Activities conducted within the marine waters will be required to comply with the Temperate East Marine Parks Network Management Plan, regulated under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth). This also has implications for water discharges from the island into the marine environment. More information about this is presented under Tactic 1.7 (Keep our waters around Norfolk Island sustainable for the enjoyment of future generations).

The marine environment around Norfolk Island supports an abundance of life including many endemic and threatened marine species. These waters are also highly valued by the Norfolk Island population for recreation, such as swimming, snorkelling, diving, outrigger, surfing, wind surfing, paddle boarding, jet skiing and fishing. The marine ecosystem is being impacted by the discharge of surface water with high nutrient and coliform levels into the ecosystem, dumping of waste into the ocean and effluent discharge from the Sewage Treatment Plant (STP). A formal program of marine water testing would determine the type and level of impacts from these discharges. During consultation for the Environment Strategy, Parks Australia (Marine Protected Areas Branch) offered to partner with Council and other relevant organisations to undertaking water quality monitoring in Emily and Slaughter Bay.

Continued discharge of polluted water from the island could result in the ongoing degradation of the Emily Bay lagoon and surrounding marine ecosystem and could result in a total loss of the coral and marine ecosystem within 5–10 years (Pendoley Environmental, 2015). This, and other reef habitats in coastal waters surrounding the island, support many endemic and endangered species. Management of the high-nutrient waters is key to the survival of the marine ecosystem and requires an integrated catchment management approach, linked to surface water quality management measures including stormwater management and erosion control. Recommendations from previous reports call for an integrated monitoring program to enable management and monitoring of water quality management solutions throughout the island (Wilson, 2017). Action 1.2e is the development of an integrated water quality management plan for Norfolk Island. During consultation, Parks Australia (Marine Protected Areas Branch) expressed their support and willingness to be involved in the development of such a plan.

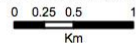


- Boreholes
- ◆ Dry boreholes
- Creeks
- Contours

Norfolk Island Environment Strategy 3001329

**Waterways and groundwater bores**

Source: Esri, Digital Globe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Location: \\AUSYFS\003\Group\projects\3001329 - Norfolk Island Environment Strategy\160 GIS\Maps\3001329\_Fig4\_WaterwaysAndGroundwater\_bores.mxd

Last updated by: EC13990 on 6/09/2016 at 9:05

**Figure 3: Waterways and groundwater bores**

### 5.2.2 Wastewater infrastructure

Of approximately 1000 on-site sewage systems on the island, the vast majority are septic tanks, with only a very small number of on-site holding tanks or package treatment systems (P Wilson, *pers. comm.* 2018). While there has been some investigation, a definitive assessment of the number, condition and associated water quality impacts of on-site sewage systems is not currently available.

Development applications (including changes of use, and certain alterations and additions) are subject to Council's Development Control Plan No 2. – Water Resources (2011) (DCP 2). DCP 2 sets out water storage requirements, effluent disposal, water conservation standards and a duty to protect waterways. It does not specify buffer distances between the sewage system and water bodies, nor does it make specifications with regard to the slope and soil conditions of the site. It is recommended that buffer setbacks from watercourses be specified in DCP 2.

While most of the island is serviced by on-site sewage treatment systems, a reticulated sewerage system known as the Water Assurance Scheme is in place in and around Burnt Pine, the town centre. This system collects sewage from the serviced area (about 10 per cent of the population) and delivers it to the STP near the Norfolk Island Airport. Sewage undergoes screening and minor primary treatment at the STP and is then discharged into the ocean. In 2016, Advisian undertook a condition assessment of the WAS. While it was limited to inspection of the manhole structures and the STP, the assessment indicated issues with corrosion and the condition of the system. During 2018, the much of the WAS system has been inspected via sewer camera and there has been no evidence of major leaks within the pipework. A number of leaking manholes, subject to regular overflows, have been detected and upgraded to prevent future overflows. The island's STP does not have any appropriate treatment for sludge and grit wastes, therefore, these wastes are pumped into the marine environment via the same outlet that receives the partially treated effluent. The STP does not have any return activated sludge (RAS) which is vital for replenishing microorganisms in the process.

Council's Development Control Plan No 2. – Water Resources (2011) states that 'developments within the area covered by the Water Assurance Scheme that generate sewage shall be connected to the Norfolk Island gravity sewer mains'. This requirement to connect to the WAS is only triggered when a development application is lodged. Where existing defective septic systems are found within the WAS area, it is recommended that further requirements for connection to the WAS be introduced. In addition, the WAS network is recommended to be extended to capture high-density development areas such as higher density housing in the upper KAVHA catchment (Wilson, 2017).

With the exception of the National Park and the public reserves, development is spread across much of the island. Therefore, a combination of a centralised (reticulated) system together with decentralised (on-site) sewage systems will continue to be needed into the future, although it is anticipated that there will be improvements in technology and maintenance requirements. This has been explored in the report Water Quality in the KAVHA Catchment (Norfolk Island Regional Council, 2017).

A framework for improving the existing Water Assurance Scheme in Burnt Pine and surrounds was developed by Wilson in 2010. Preliminary designs have been prepared for the following elements of the system which were found to be the most appropriate:

- a combination of pressure and gravity-fed sewers for the expansion of the collection system
- sub-surface flow wetlands for the treatment process

- reuse of treated effluent for flushing toilets and irrigation
- use of vermicomposting for the stabilisation of sludge.

To enable a new wastewater management strategy to be developed, more data is required. To enable development of a fully calibrated and validated model that meets best practice, influent and effluent flows and quality data needs to be collected for all seasons. The cost of measurement using grab samples can be expensive. In addition, testing and conducting these on the island may be prohibitive. Simple continuous gauges that are monitored remotely and integrated into an assessment management system could be used and show triggers on both a high level as well as at the device on the plant. The modelling of the system requires a lot of data and asset management information. Maintaining and running the models can be costly and requires intensive computing. Outsourcing and running the cloud-based models would be a better option. Scenario modelling can be conducted and a data analytics plug-in would enable on-demand assessment.

Increases in resident population and visitor numbers will further increase the negative effect of sewage on groundwater and marine ecosystems. Therefore, the balance of centralised and decentralised systems needs to be considered alongside the current condition and future water quality and water balance aspirations.

In summary, while it is known there is an adverse impact to water quality resulting from sewage, the full extent and primary contributors are not known.

### **5.2.3 Previous assessments and strategies**

In recent years, several water quality assessments and strategies have been conducted and implemented, including:

- Review of Groundwater Data for Norfolk Island (EGC, 2008)
- Assessment of Groundwater Contamination in the Built-up Areas of Norfolk Island and the Lower Catchment (Wilson, 2010)
- Norfolk Island Water Quality Study Emily Bay and Upper Cascade Creek Catchments (URS, 2013)
- Norfolk Island Sewerage Network – Preliminary Condition Assessment Report (Advisian, 2016)
- Norfolk Island Regional Council Drinking Water and Recreational Waters Monitoring Program (GHD, 2016b)
- Norfolk Island Water Quality and Sewerage Infrastructure Management Strategy (ANI, 2014)
- Water Assurance Overview and Future Recommendations (Wilson, 2016)
- Water Quality in the Kingston and Arthurs Vale Historic Area (KAVHA) Catchment (Wilson, 2017)
- Emily Bay and Upper Cascade Creek Catchments – Norfolk Island Water Quality Study (AECOM, 2017).

Each one of these determined that many of the island’s freshwater resources were impacted by contaminants associated with human activities.

Council adopted the report, Water Quality in the Kingston and Arthurs Vale Historic Area (KAVHA) Catchment (Wilson, 2017), on 20 December 2017 (Council Resolution 2017/221). The report included a number of recommendations to address contaminants entering the KAVHA catchment, and the following recommendations need to be implemented:



- Divert the Town Creek outlet (and associated stormwater) from entering Emily Bay into settling ponds. This will allow impurities to settle out, reduce the impact to Emily Bay, recharge groundwater supplies and allow the water to be used as a resource.
- Develop a wetland and leaky weir system across the catchment to allow the natural uptake of nutrients and pathogen containment while reducing the volume of water that is released into the Emily Bay and allow the underground aquifers to be replenished.
- Conduct an audit of septic systems within KAVHA and the upper catchment.
- Develop plans of management for effluent in KAVHA and connect the houses in Little Cutter’s Corn to the Water Assurance Scheme.
- Exclude livestock from Watermill Creek by fencing or cattle collars with a 5 m buffer zone either side and install water troughs in an area well clear of permanent water bodies.

#### 5.2.4 Water quality testing

Water quality issues were first recorded in the 1960s, when outbreaks of gastroenteritis led to concerns about the quality of the island’s freshwater. Assessments of some of the island’s shallow groundwater wells were commissioned and the water was deemed unfit for human consumption due to high levels of faecal coliforms and nitrates. Subsequent assessments in the 1980s revealed groundwater was contaminated with high levels of detergents, nitrates, chloride, faecal coliforms, and viruses (Murphy, Grohmann, Sexton, 1983). Evidence suggested that wastewater and livestock effluent was primarily responsible for the contamination. While irregular, and with varying sampling intensity, water quality sampling has continued since this time. Little improvement in water quality has been observed. Samples collected in an assessment Emily Bay and Upper Cascade Creek Catchments – Norfolk Island Water Quality Study (AECOM, 2017), recorded levels of E. coli above the adopted guideline values for human health impacts in all but one sampling location. These results were compared to previous studies and found to be consistent.

Water quality monitoring has recently increased in frequency and number of sampling locations. Potable water testing has been conducted at all private drinking water suppliers on the island including each food outlet, water carter and visitor accommodation. Water quality testing of drinking water suppliers is due to increase significantly following the implementation of the *Public Health Act 2010* (NSW)(NI). In addition, the recreational waters in KAHVA have been monitored on a weekly basis over the bathing season and extensive water monitoring has been carried out across the catchment.

To date, water quality monitoring has focused primarily on contaminants of concern to humans (e.g., E. Coli, viruses) and there seems to be little long-term data available for other contaminants. As such, there are still substantial knowledge gaps in the status of the island’s fresh and marine water quality.

#### 5.2.5 Action Plan for Tactic 1.2: Protect and enhance our water quality

Prioritised actions to address Tactic 1.2 are provided in **Table 6**.

**Table 6. Actions Plan: Protect and enhance our water quality**

Ref	Item	Action	Priority
1.2a	Water quality Baseline data	Collate all the existing data and reports to create an overall database and water quality picture of the island.	Priority 1
1.2b	Expand the Water Assurance Scheme Network	Investigate the option of expanding the WAS network to be extended to capture higher density development areas, such as high-density housing in the upper KAVHA catchment.	Priority 1

Ref	Item	Action	Priority
1.2c	Existing individual on-site sewage treatment systems, septic tanks and holding tanks	Develop and implement an inspection, maintenance and improvement strategy for existing individual on-site sewage treatment to improve treatment outcomes and phase out existing septic tanks and soakage trenches	Priority 1
1.2d	Design and maintenance of on-site systems	Develop and implement Guidelines to be included in Development Control Plan No 2. – Water Resources (2011) to design and maintain on-site sewage systems as per best practice Australian guidelines. Phase out the use of septic tanks and soakage trenches for new development applications.	Priority 1
1.2e	Water Quality Management Plan	Develop an integrated water quality management plan for Norfolk Island. This should include freshwater (surface water, rainwater and groundwater) and marine water ecosystems.	Priority 2
1.2f	Natural barriers to freshwater runoff	Investigate constructing, enhancing or restoring wetlands to improve water quality entering the marine environment, particularly Emily Bay. As this has the ability to impact on KAVHA buildings, this must be undertaken with the appropriate heritage expertise via the KAVHA Commonwealth Heritage Manager.	Priority 2
1.2g	Replacing ageing STP infrastructure	Investigate replacing ageing infrastructure at the STP to improve treatment outcomes.	Priority 2
1.2h	A feasibility study on the installation self-treating septic systems	Investigate the feasibility of decentralised waste-water treatment systems that connect and service multiple upgradient dwellings.	Priority 3

## 5.3 Tactic 1.3 Reduce, reuse and recover waste and end disposal of waste into the sea

### 5.3.1 Current situation

#### 5.3.1.1 Waste

Waste management is a worldwide issue; however, the difficulties in managing waste are greater for small island locations, such as Norfolk Island. The remote location restricts access to waste disposal and recycling facilities and the small size of the island means that landfill is not a feasible option.

The Australian Department of Agriculture and Water Resources places conditions on the importation of fresh fruit and vegetables for biosecurity purposes, so most produce is grown locally. This results in less transport and packaging and therefore, less waste. Waste generated from packaging of imported goods contributes significantly to the volume of waste managed on the island.

The former Administration of Norfolk Island was aware that waste management did not meet with Australian best practice, and made efforts to improve the system. It commissioned APC Waste Consultants in 2015 to prepare a Waste Management Strategic Plan (WMSP), which built upon the findings of the 2000 Waste Management Audit (CRC for Waste Management and Pollution Control and A. Prince Consulting). Council is now responsible for waste management and has adopted the WMSP to guide operations. The overarching goals for waste management under the Norfolk Island Regional Council Delivery Program 2016–2020, include:

- Cease ocean disposal of waste by June 2018. While this deadline has been extended to November 2018, Council is committed to completing the waste management infrastructure upgrades that underpin the achievement of this goal. For example, Council’s multi-purpose baler and sort line are being installed as the time this Environment Strategy is being finalised.
- Investigate advanced waste technologies for the future.
- Provide ongoing and consistent educative recycling information to the community on a minimum of a quarterly basis.

The current and proposed waste-management strategies as per the adopted WMSP are outlined in **Table 7**.

**Table 7: Waste management strategies for Norfolk Island**

Item	Description
<b>General waste collection/disposal including plastics</b>	<p>The current method of solid waste collection/disposal for both residents and commercial premises is to deliver solid waste to the waste management centre (WMC) between the hours of 7am to 3pm Tuesday and Saturday, and 7am to 1pm Wednesday to Friday. No curb-side collection takes place on the island.</p> <p>Residents are encouraged to separate recyclable materials including glass, aluminium and steel food cans, batteries and general rubbish into labelled chutes within the WMC. The waste streams are then stored on the floor of the WMC for removal by the staff.</p> <p>Recyclables and hazardous wastes are exported off the island and residual waste is burned in open air at the Headstone Disposal Centre, with the burned waste disposed of into the ocean.</p>

Item	Description
	<p>As of 2017, the WMC charges a fee for disposal of general waste ranging from \$2 for up to 120 litres of waste to \$20 for 2000 litres or 2 m<sup>2</sup> of waste. Disposal of recyclables is free for domestic loads.</p> <p>A multi-purpose high-density baler, sorting line and bale wrapper was purchased by Council in October 2017 to meet the Operational Plan target of no waste disposal into the sea by June 2018 (extended to November 2018). The baler is being installed as of November 2018. The multi-purpose baler will be capable of compressing and baling aluminium cans, steel cans, plastics, cardboard and residual waste streams for export for recycling or disposal.</p>
<b>Aluminium cans</b>	<p>At present, aluminium cans are emptied into a bunker by forklift and manually loaded into a crusher, baled into briquettes, stored on pallets, then shipped off the island. The current process of crushing and baling will be superseded once the multi-purpose high-density baler (see above) is installed.</p>
<b>Glass</b>	<p>Glass is crushed using a Glass Aggregates Systems crusher unit. Crushed glass is made available to the public for a fee as per the 2018-19 Operational Plan. WMC staff advise that glass crushing is very labour intensive as bottles are loaded onto the incline belt and crushed one at a time. However, a surge hopper attachment for the WMC's glass crusher has been purchased by Council and will be installed in 2018. This hopper will be retrofitted to the existing crusher and allow for automated and regulated feed of glass into the system. The crushed glass will be available for use as an aggregate alternative for driveways, paths, pipe laying and bedding for water tanks. This is pending control of Argentine ants, which have previously been attracted to the sugar residue in the bottles and were spread via the crushed glass.</p> <p>The local soft drink company has a deposit scheme in place to reclaim and reuse glass beverage containers, but currently, the remainder of the glass waste is disposed into the ocean.</p>
<b>Organics</b>	<p>A composting system called 'HotRot' and associated infrastructure has been purchased by Council and is expected to be delivered to Norfolk Island by October 2018. The composting system will can manage all the organic waste streams including livestock carcasses, food scraps, butchers' waste, cardboard and paper, green waste and untreated timber.</p> <p>Currently, garden waste is not accepted at the WMC until the composting system in operational at the WMC. Green waste is currently stockpiled, chipped or burned across the island.</p> <p>Livestock carcasses and other food waste are currently dumped off the Headstone Disposal Centre into the ocean.</p> <p>A 25-litre high-temperature incinerator (located at the STP) is used to dispose of putrescibles, biosecurity waste and hospital/vet waste. This is not large enough to cope with the current demand, and it is estimated that a 200-litre incinerator is required to meet current demand.</p>
<b>Asbestos</b>	<p>Asbestos containing material is currently stored in crates within the WMC, some undercover and some external to the building. There are more than 100 tonnes of asbestos packaged and awaiting export.</p> <p>This backlog of asbestos waste is proposed to be removed from island via cargo ships or airfreight as soon as practicable.</p> <p>It is not currently known what volume of asbestos remains on-island in buildings and structures.</p>

Item	Description
<b>Cars / tyres and other bulky waste</b>	It is estimated that around 1100 tyres are delivered to the WMC annually. Tyres are shredded and placed into used IBC containers or postal boxes and exported for recycling.  A metal baler has been identified as an essential piece of equipment for waste management and will be capable of compressing items such as sheet metal, car bodies, bike frames, bulky furniture and white goods ready for export.
<b>Chemicals</b>	The WMC accepts all types of chemicals including oils and lead acid batteries. A 10 IBC capacity dangerous goods cabinet was installed at the WMC in July 2018. This cabinet is lockable and complies with AS1940–2004.
<b>Other</b>	Printer cartridges are sent to Planet Ark, but due to Norfolk Island’s remote location, collection isn’t free. Council therefore covers the cost of exporting printer cartridges to Brisbane where collection is free. E-waste is exported via airfreight on a semi-regular basis.
<b>Backlog</b>	There is currently a significant backlog of stored waste at the WMC awaiting export. Many of these materials (asbestos, batteries and chemicals) are awaiting permits to enable off-island disposal.  Glass, plastic, steel cans, other steel products are continuing to be disposed of to the ocean post burning and are not stockpiled for resource recovery
<b>Truck deliveries</b>	Commercial loads of non-recyclable waste and builders waste are delivered directly to Headstone Disposal Centre.

From stakeholder consultation, it is concluded that:

- The 2018 targets for waste management enhancement set out in the adopted Norfolk Island Delivery Program 2016–2020 have not been met, mainly due to shipping delays.
- The remoteness of the island from potential recyclable markets and final disposal facilities presents significant challenges to the environmentally sustainable and cost-effective management of resources and waste.
- Funding constraints appear to be causing delays in implementing the identified enhancement programs, most of which are strongly supported by the majority of stakeholders.

### 5.3.2 What further information do we need?

In order to assess the status and effectiveness of current waste reduction, reuse, recovery and disposal programs the following information would be required:

- Status report against the WMSP identifying the completed, in progress, and outstanding actions
- A status update of the plant, machinery and equipment that has been procured and/or in the process of procurement
- Updated waste stream data estimates.

### 5.3.3 Action Plan for Tactic 1.3: Reduce, reuse and recover waste and end disposal of waste into the sea

Prioritised actions to address Tactic 1.3 are provided in **Table 8**.

**Table 8. Action Plan: Reduce, reuse and recover waste and end disposal of waste into the sea**

Ref	Item	Action	Priority
<b>1.3a</b>	Waste Management Implementation	Develop a Waste Management Implementation Action Plan so that actions adopted in the Waste Management Strategic Plan (2015) are recorded and tracked including:	<b>Priority 1</b>

Ref	Item	Action	Priority
	Action Plan	<ul style="list-style-type: none"> <li>Item / issue description</li> <li>Priority rating from Medium to Immediate</li> <li>Close out methodology / procedure</li> <li>Close out date</li> <li>Person responsible</li> <li>Status update of the plant, machinery and equipment that has been procured and/or in the process of procurement</li> <li>Updated waste stream data estimates.</li> </ul>	
<b>1.3b</b>	Further waste management opportunities and policies	<p>Establish further waste management opportunities and policies to reduce and better manage waste within the bounds of current legislation. For example:</p> <ul style="list-style-type: none"> <li>One car on / one car off the island</li> <li>Continue with the already successful policy and outstanding community efforts (e.g. Boomerang Bags) to reduce plastic bags</li> <li>Encourage people to use reusable drink bottles instead of disposable plastic bottles</li> <li>Reduce packaging on imported goods, e.g. work with manufacturers and freight agents to reduce plastic and polystyrene packaging</li> <li>Encourage purchasing opportunities that support reduced waste imports to the island</li> <li>Commercial private waste collection services for interested parties, e.g. hotels, businesses, individual households</li> <li>Build on the existing waste education/awareness campaign including information events, school programs, competitions and awards.</li> </ul>	<b>Priority 1</b>
<b>1.3c</b>	Improve waste management facilities and processes to reduce impact on the environment	Expand the WMC to allow for additional bays for larger units of specific waste streams such as oil drums, white goods and batteries. The warehouse should be lockable with access controlled by WMC staff. Bays are to be undercover protected from inclement weather, made of hardstand flooring, bunded with sumps to collect spills/leaks, labelled. The potential also exists to have solar panels installed on the larger surface area roof to assist with power generation and reduce power costs.	<b>Priority 2</b>
<b>1.3d</b>	Develop facilities to encourage reuse of waste	Develop a dedicated resource recovery facility, containing recycling bays for timber, white goods, household goods, furniture and clothing for residents to select materials they wish to reuse.	<b>Priority 2</b>
<b>1.3e</b>	Advanced waste treatment technologies	Investigate the feasibility of advanced waste treatment technologies such as waste to energy.	<b>Priority 2</b>

## **5.4 Tactic 1.4 Plan for additional pressures on water resources, transport, utilities and telecommunications infrastructure**

### **5.4.1 Introduction**

In 2016, Norfolk Island had a population of 1748 (ABS, 2016). The main industry is tourism, which generates up to 41 per cent of Norfolk Island's Gross Island Product (ACIL Tasman, 2012). In 2009, Parsons Brinkerhoff stated that in peak times, the Norfolk Island population can almost double due to the influx in visitors. While the number of visitors varies from year to year, the visitor population is an important consideration when planning for the future. The Norfolk Island Tourism Strategic Plan 2012–2023 is designed to rebuild the tourism industry framework to provide for a greater level of self-reliance in five strategic themes, one of which is to increase visitor numbers arriving both by aircraft and cruise ship. This has far reaching environmental implications for Norfolk Island.

When asked what the ideal resident population of Norfolk Island should be, 74 per cent of respondents in the initial CSP consultation indicated a figure of 2000 to 3000 (Monaghan Strategic, 2016). One hundred and twelve (112) respondents participated in this initial round of consultation for the CSP. This consultation informed respondents that the number of visitors on the island at the time of the consultation was 599. Fifty-five (55) per cent of respondents thought the ideal visitor population at any one time was 600 to 1000, while 41 per cent thought it should be more than 1000. This community desire for an increased population and increased visitor numbers is reflected in Tactic 2.2: Recognise growth of the population is linked to the long-term sustainability of the Norfolk Island community. Given the community desire for an increased resident and visitor population, planning for additional pressures on resources such as water, transport utilities and telecommunications infrastructure is essential.

Tactic 1.6 (Create a water secure future) discusses Norfolk Island's long-term water supply requirements, and Tactic 1.2 deals with the protection and maintenance of water quality. Therefore, water resources are not discussed further here. Electricity generation infrastructure requirements and planning for additional pressures upon that infrastructure are discussed in Tactic 1.1 (Develop a clean energy future).

### **5.4.2 Planning for additional pressures on telecommunications infrastructure**

Council is responsible for the provision of much of the telecommunications infrastructure on the island. The website for Council owned 'Norfolk Telecom' lists the following infrastructure:

- fixed line telephone using copper twisted pair cable and optic fibre
- primary and secondary satellite earth Stations
- GSM mobile switch including eight remote base stations and one micro cell
- central public exchange, which switches international as well as national traffic
- broadband internet connection (ADSL)
- internet service provider (ISP).

As part of its Business Plan 2017: Futureproofing Telecommunications, Council recently received a grant to upgrade the current 2G mobile network to 4G. This has the significant benefit of offering mobile data for internet access as well as improved mobile phone service. This will require several new towers and associated infrastructure to be installed across the island. Telecommunications infrastructure, such as towers and cabling, has the potential to have significant impacts on the landscape and scenic amenity. In mainland Australia, telecommunications infrastructure was initially

rolled out very quickly, with little time to fully assess the impact on the amenity of an area (Parliament of Australia, 1996).

Clause 101 of *The Norfolk Island Plan 2002* (NI) classes works that are carried out in accordance with the *Telecommunications Act 1992* (NI) as exempt (from the need for a development application). This is generally, however, where the works are of a minor nature. Major public works are defined as those that include the use or development of land for the purposes of transmitting and/or receiving installation for telephone, radio broadcasting, television, cable or satellite television. The term includes any office necessary for the administration of the public work located on that Land. The term also includes any works depot used exclusively by the Administration (now Council), and/ or by individual or combined emergency service providers.

The majority of the land area of Norfolk Island is classified in the High Rural/Conservation Value area of Part A of the Norfolk Island Plan 2002. This area only has four zones: Rural, Open Space, Conservation and Special Use. The Strategic Plan and Zoning maps are shown in Figures 7 and 8. In the Conservation Zone, Public Works (Major) are prohibited, and in all other zones, they are Permissible with Consent. This effectively means that unless future telecommunications infrastructure is minor in nature, the works will require a development application, or will be prohibited (in the Conservation Zone). This allows for proper assessment of future telecommunications works such as towers and their potential impact on scenic, environmental, landscape and other values within the Norfolk Island Plan 2002.

The NBN Co Satellite service is now available on Norfolk Island. This requires a small satellite dish to be erected at each receiving site, not large enough to trigger the requirement for a development application. No trenching or other infrastructure is required. Trenching for telecommunications installation can damage tree roots and increase the incidence of some diseases (Brereton, 2018). This is particularly problematic where trees are threatened species, or where they possess cultural or heritage values, or are otherwise significant. The intention with future telecommunications trenching is to use the existing footprint for cabling wherever possible (A Innes-Walker, Pers. com. 2018).

### **5.4.3 Planning for Additional pressure on Transport Utilities**

#### *5.4.3.1 Road Transport*

Norfolk Island is small and rugged, and the main modes of transport are small cars, motorbikes and small to medium utes (known locally as 'trucks'). Walking and cycling are common, especially for school transport, however, there are limited pathways and dedicated cycling tracks to accommodate this mode of transport. There is no public transport network available on the island. Norfolk Island has a large number of cars and there has been little done to address the overall high number of vehicles (Diatloff, 2008). In 2013, there were 2365 registered and a further 564 unregistered vehicles on the island (Faulks and Irwin, 2015). Many of these vehicles are hire cars to service the tourism industry. Small scale communal transport has been trialled at various times over the past few decades, including school bus runs, private taxi services and a courtesy shuttle van. These have all been privately owned or offered by local service organisations. As outlined below, all fuel has to be imported by tanker to the island. A small number of electric cars are already present on Norfolk Island, and where these are recharged by solar power, they do offer a genuine environmental benefit. Consideration might be given to the potential for electric cars to be recharged using solar power as part of the solution to the island's need to disperse excess electricity via a heater bank (see Tactic 1.1: Develop a clean energy future).



Norfolk Island has 77.8 km of paved roads, (Faulks and Irwin, 2015). The roads are generally in a poor condition with potholes a source of community and tourist frustration (Worley Parsons, 2015). The quality of roads was identified in the list of the top 10 issues to be addressed in the future (Community Strategic Plan 2016–2026). In their Norfolk Island Roads Audit and Strategy Report, Worley Parsons (2015) found 30 km of roads were rated as Condition 2 (urgent attention needed), with an estimated repair cost of \$10–\$15 million. The 2015 report stated that rock supply was adequate in the short term for roadworks, noting however that a new quarry was needed. This situation has now changed, with very little rock available on the island (A Buckley, *pers. com*, 2018). Rock supply presents a major limitation for road maintenance, as crushed rock is essential for asphalt resurfacing. All other materials for road infrastructure works are imported (Worley Parsons, 2015).

#### 5.4.3.2 Aircraft

The first Norfolk Island runway was originally a grass airstrip, constructed in 1942 with assistance from the United States Air Force (Norfolk Island Regional Council, 2018g). Since that time, the runway has been extended, and the surface paved to allow for modern jet aircraft to land. Today the airport has two paved asphalt runways, one measuring 1950 m long by 45 m wide, and the other is 1435 m long by 30 m wide. Current regular commercial flights are made by Airbus A320 aircraft which have a maximum capacity of 168 passengers. Some air freight is carried to and from the island, although at the time of preparation of this plan, there was no regular designated air freight service. Occasionally other aircraft use the runway including charter flights, medical evacuations and large freight delivery aircraft.

From 2012 onwards, the total aircraft movements in and out of Norfolk Island average approximately 500–600 annually. This equates to approximately 65,000 passengers moving to and from Norfolk Island per year (Australian Government Department of Infrastructure, Regional Development and Cities, 2017). Visitors make up a significant proportion of these passenger movements, and over the last 13 years, an average of 27,565 visitors come to Norfolk Island each year (Norfolk Island Regional Council, 2018i). The peak month is March (2786), with the low season in July (1703). With tourism the mainstay of the Norfolk Island economy, and the runway being responsible for the vast majority of visitor transport to the island, it is crucial to the economic sustainability of the island.

Amongst other things, resealing and maintaining the runway requires a supply of crushed rock. **Figure 4** shows that every 10–12 years, there is a peak in rock required on the island, and this corresponds with resurfacing of the Airport runways. The current condition of the runway has been listed as an ‘observation’ in recent Civil Aviation Safety Authority (CASA) audit reports and in 2017 the runway was assessed in accordance with *ASTM D5340-12: Standard Test Method for Airport Pavement Condition Index Surveys* and short-term maintenance requirements to address existing surface pavement issues were identified (GHD, 2017). GHD recommended these works are commenced within 24 months of the assessment report however no readily available source sufficient to supply the 40,000 tonnes of rock has been identified locally. If this cannot be sourced locally, the only alternative is importation.

#### 5.4.3.3 Shipping

Norfolk Island does not have a harbour, but instead uses Kingston Pier on the south coast and Cascade Pier on the north coast for all shipping with the exception of fuel importation, which is brought in at Ball Bay. The two piers are used to launch local fishing boats: an important part of Norfolk Island life, which is discussed further in Tactic 1.7.

During suitable weather and sea conditions, cargo is unloaded from the ship by crane onto eight-metre-long whaleboats, known locally as ‘lighters’. Lighters carry up to five tonnes of cargo at a time and are towed to the piers by motorised launches. Freight is either palletised or packed in custom built wooden crates. Cargo ships have visited Norfolk Island from both New Zealand and Australia for decades, and at present a ship arrives every month or so via New Zealand. Shipping is essential for the import of almost all products that are not produced locally including food, building materials and household goods.

Incoming sea freight in 2017–18 was about 18,000 revenue tonnes<sup>1</sup> (Norfolk Island Regional Council, 2018). It is expected this will drop to about 15,000 tonnes in 2018–19 as the 2017–18 year included one-off freight deliveries for the recently completed upgrade of the Cascade Pier. Outgoing sea freight is minimal and includes kentia seeds, empty beer kegs, personal effects, waste metals and rubber for recycling. Outgoing sea freight will soon increase, due to plans to increase waste exports for offshore disposal and recycling.

A fuel tanker ships petrol, diesel and jet fuels, and a separate gas tanker brings Liquefied Petroleum Gas to Norfolk Island. The tankers anchor in Ball Bay on the southeast coast, where the island’s bulk fuel storage facilities are located. The tanker is secured to onshore bollards and a floating hose is connected to pump fuel to the onshore storage tank inlet. With no local sources of fuel, this import system is essential, especially as Norfolk Island must offer aircraft the ability to refuel. A fuel truck now allows for aircraft refuelling, where an underground hydrant system was once used at the airport. The underground hydrant system at the airport is no longer in use and should be suitably decommissioned and checked to ensure no contamination is present.

As noted previously, the Norfolk Island Tourism Strategic Plan is looking to increase visitor numbers arriving not only by aircraft, but also by cruise ship. At present, only a very small percentage of visitors arrive by cruise ship. The Norfolk Island Tourism Strategic Plan includes a potential increase in the number of cruise ship passengers to a total of over 40 000 per annum by 2021. Therefore, the impact to the environment and the island’s capacity to carry this number of visitors must be assessed and monitored. Cascade Pier has just been upgraded, so is 24 m longer and 1 m taller than it was prior to the upgrade which commenced in 2016. In addition to the pre-existing fisherman’s crane, a boom dock hydraulic crane has been installed for heavy freight and passenger transfer vessels from cruise ships. To try to increase the number of cruise ships that visit Norfolk Island, new passenger transfer vessels are being constructed in mainland Australia, and are expected to be available in 2019 (McVeigh, 2018). To facilitate the upgrade of Cascade Pier, a large amount of rock had to be sourced locally. The recent upgrade to Cascade Pier highlights the fact that the supply of rock is an essential natural resource planning issue for the upkeep of Norfolk Island’s infrastructure.

#### **5.4.4 Essential resources for transport, telecommunications and other utilities**

##### *5.4.4.1 Rock supply*

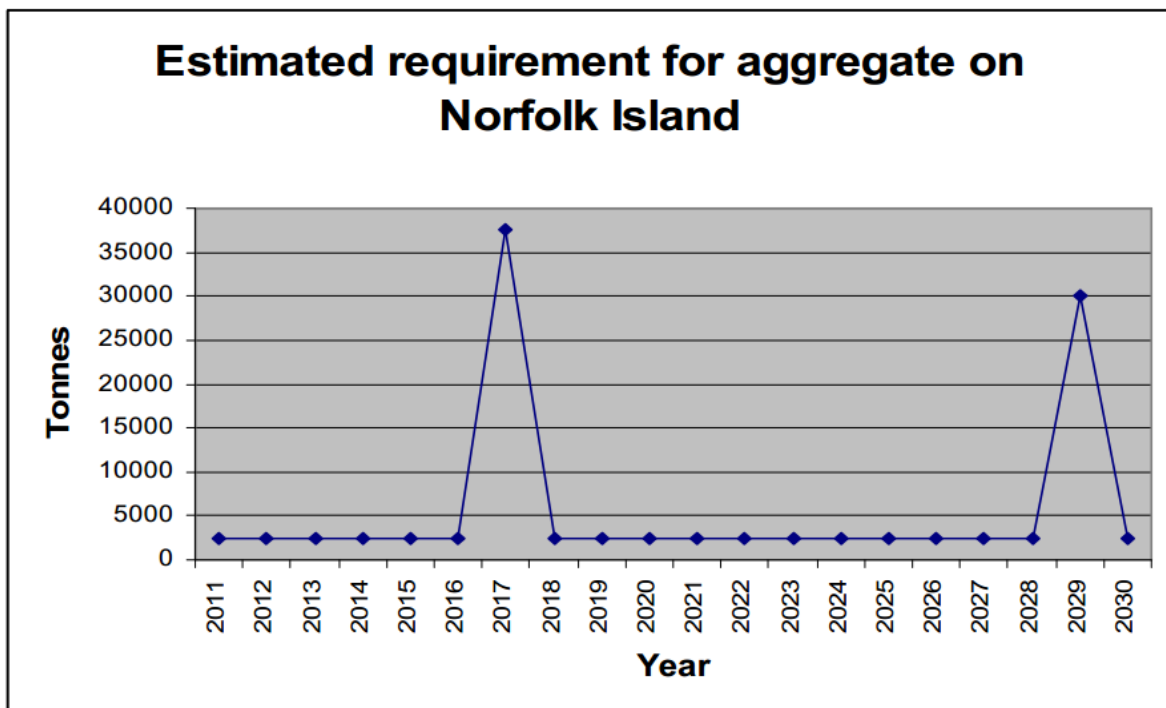
Norfolk Island represents the remnants of volcanoes that were active between 2.3 and 3.05 million years ago (Jones and McDougall, 1973). Therefore, although there are very small areas of sedimentary and carbonate based rocks, Norfolk Island is primarily basaltic (Watkins Consulting, 1999). This

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<sup>1</sup> Revenue tonnes are derived by calculating the weight and volume of the cargo: freight is then charged on whichever is higher

volcanic basalt is the island’s only local source of crushed rock for infrastructure such as road base, concrete and airport runway works (McNeil, 2010). The properties of basalt rock vary somewhat, and certain areas of Norfolk Island have been found to have better quality basalt for construction and crushing. For many years, the cliff at Cascade Pier provided a source of quality rock (McNeil, 2010). This was initially operated as a quarry, and later the cliff was benched to stabilise it for safety reasons. The Cascade cliff safety project itself yielded a large quantity of rock that was then stockpiled for future use.

In 2010, the then Administration of Norfolk Island estimated that over the preceding 20 years, the average amount of rock taken from Cascade quarry was approximately 7000 tonnes per year. **Figure 4** shows the estimated aggregate requirements from that report. The peaks in predicted rock requirements every 10–12 years are due to the need to reseal the Airport runway. Should Norfolk Island undertake other major infrastructure works such as a breakwater or further upgrades to the piers, these are beyond the projection shown in **Figure 4**.



**Figure 4: Administration of Norfolk Island, 2010 estimate of future aggregate (crushed rock) requirements on Norfolk Island**

Additional pressure on transport infrastructure, such as roads, the piers and the airport runway means additional maintenance and upgrades, which means more rock is needed. Forward planning for such infrastructure requirements allows for the environmental impacts of such projects to be properly considered, and for alternatives such as importing of materials to be scoped. Council have established a Rock Feed Source Advisory Committee (the Committee) to identify and advise Council on any available rock feed source. The Committee minutes during 2017 and 2018 show that the Cascade Cliff Safety project stockpile is exhausted, and rock is now very scarce. Locations at Cascade and Headstone are currently being discussed for future rock supply, noting that such projects would need to use a newly proposed amendment to the *Planning Act 2002* (NI) (Rock Feed Source Advisory Committee Meetings, 2018). The proposed amendment is being made in response to the March 2017 Council Resolution ‘That Council supports any planning proposal that addresses the barriers to significant

projects, such as the winning of rock, to be achieved'. This amendment to the *Planning Act 2002* (NI) has not yet been finalised, and Council is yet to determine the preferred source of rock.

The current Council estimate for 2019 resealing of the airport runway is 40 000 tonnes of rock, with no confirmed source, and the Significant Development Pathway still not complete. If rock cannot be sourced locally, the only alternative is to import it. Previous community consultation on the import of such material has given rise to biosecurity concerns, and it is anticipated that the material would need to be treated to ensure no unwanted pests or diseases were inadvertently imported (A Buckley, *pers. com*, 2018).

From an environmental perspective, it is preferable for rock extraction sites to be scoped early and impacts assessed against each other holistically rather than being driven by ad hoc development applications. To allow Norfolk Island to plan for further rock requirements, it is recommended that Council appoint a natural resource planner or contract out resource planning, with the aim of assessing essential natural resource requirements and sourcing the most environmentally sustainable source of each resource into the future. This would avoid the situation Norfolk Island finds itself in every few years when rock, timber or sand is suddenly in short supply, so quick, reactive solutions that sometimes represent poor environmental outcomes need to be found.

#### 5.4.4.2 *Current and future sand supply*

The Kingston area of Norfolk Island is composed of calcarenite, which is a limestone formed from consolidated sand (Stephens and Hutton, 1954). The Kingston area features sandy beaches and is the largest area of sand on the island. Apart from Kingston, there are only small pockets of sand, notably at Anson Bay Beach and the Bumbora area.

Sand is required locally for plastering, block and brick laying, installation of water storage tanks and tiling. Sand is sourced from the KAVHA area which has significant archaeological and ecological significance, and for a number of years, the supply has been very low (Diatloff, 2008). The taking of sand from the source in KAVHA at the Point Hunter Reserve is regulated under the *Public Reserves Act 1997* (NI) and a permit must be sought from the Conservator of Public Reserves in Council (Administration of Norfolk Island, 2003). Imported, pre-packaged sand is available for sale in small quantities. This is a costly alternative when calcarenite beach sand is not suitable, such as in the nursery industry.

Commencing in around 2009, crushed glass was trialled as a sand replacement for water tank bedding and pipe laying, (discussed further in Tactic 1.3: Reduce, reuse and recover waste and end disposal of waste into the sea). However, the sugar in the glass soft drink bottles had the unfortunate impact of spreading Argentine ants, and was stopped. As the time of preparation of the Environment Strategy, an in-feed hopper attachment for the Council owned glass crusher had been purchased with the intention of again producing crushed glass for sand replacement, but also controlling Argentine ants at the crushing source (Norfolk Island Regional Council, 2018f).

#### 5.4.4.3 *Sustainable timber supply*

In 2012, Dr Neil Byron carried out a very useful and detailed study entitled *The future role of the National Park Forestry Zone in a Sustainable Forestry Sector on Norfolk Island*. The study not only looked at the Forestry Zone, but at the supply of timber generally across Norfolk Island. The study determined that there was no economic advantage to growing timber on Norfolk Island, particularly as a Government Business Enterprise. This is because the cost of locally grown and milled pine timber

is similar in cost to radiata pine imported from New Zealand. Byron outlined that the processing capability of the local mill was a limiting factor, as the volume of timber produced locally isn't of sufficient volume to justify a larger mill, which would reduce local processing costs. The study was based on the economics of the timber industry, and did not focus on the environmental or social costs of importing all timber from New Zealand.

The former Administration of Norfolk Island supported the idea of a local timber industry as opposed to importing all timber from overseas (Byron, 2012). About half of Norfolk Island's timber supply is grown and processed locally, with the remainder imported from New Zealand (Deloitte, 2014, Byron, 2012). The local timber supply is limited almost exclusively to the endemic Norfolk Island Pine (*Araucaria heterophylla*).

The lack of local timber for milling has long been recognised (Mosley, 2001). The manager of the only remaining commercial timber mill was interviewed during stakeholder consultation and confirmed that there is a shortage of quality trees for timber, with an increasing demand for hardwood (M Christian, *pers. com.* August 2018). Pines take 50 to 80 years to reach the optimum size for logging. Trees are not currently sourced from a commercial-style forestry plantation, but are harvested/salvaged across the island, including from private and public land (with the exception of the Norfolk Island National Park). Approximately 50 trees are milled each year (M Christian, *pers. com.* August 2018), although Byron reported that approximately 80 trees were being milled each year in 2012. While the mill produces in the order of 600–1000 m<sup>3</sup> of timber annually, this doesn't necessarily equate with sales due to the time required for milled timber to dry. Byron, 2012 reported that approximately 1000 m<sup>3</sup> of NZ radiata pine was being imported annually from New Zealand.

Imported timber must be treated for biosecurity reasons, so the local mill is the only commercial source of untreated timber which is used for internal lining of residential buildings, furniture and wood turning.

The mill has recently taken on the lease of the Council owned Tanalith Plant, where timber is pressured treated with CCA (Chromated Copper Arsenate). Approximately 600–800 m<sup>3</sup> of timber are treated and sold each year. Previously the Tanalith Plant was a Government Business Enterprise of the former Norfolk Island Administration. Without the operation of the Tanalith Plant, all treated timber would need to be imported.

The taking of native trees is regulated under the *Trees Act 1997* (NI) and requires that the Conservator of Public Reserves assess the tree before it is taken for milling. The Act allows for the taking of pines that are dying (due to disease or age), or that pose an unacceptable risk to life or property. While this offers protection to healthy pines, it also means that the quantity of usable, saleable timber is usually reduced because of the condition of the tree. Unlike plantation timber, the quality also varies considerably due to factors that are better controlled in a forestry setting, e.g. rot, knots, borers, shake, wind impacts, tree age and size. Trees can also be located in very inaccessible locations which increases the cost of the operation.

The mill is a family business, and to address the potential future local timber shortfall, the family have been planting pines since the late 1970s. With no local nursery to supply pine seedlings, this has become increasingly difficult, and represents a genuine sustainability issue for the future of Norfolk Island. In order to supply Norfolk Island with local timber into the future, a commercial source of pine seedlings will need to be made available, and some form of forestry operation undertaken which

allows for planted trees to be milled. Tactic 2.6 (Protect and preserve vegetation communities and habitat) discusses the reestablishment of the native plant nursery by Parks Australia, and how Council might assist in this process.

The Norfolk Island National Park Management Plan 2018–2028 (NINP Management Plan) includes information on the use of timber resources located in what is known locally as the ‘Forestry Area’. Under the previous Park Management Plan, forestry operations in this area were managed by the Norfolk Island Parks and Forestry Service or otherwise outsourced. The Norfolk Island Parks and Forestry Service was part of the former Administration of Norfolk Island, and no longer exists. The current NINP Management Plan includes the following action: ‘2.10.9 – *In consultation with the Norfolk Island Regional Council and other relevant stakeholders, undertake a review of the Forestry Area to determine its future use and rehabilitation requirements.*’ It also states that the area will be rehabilitated with native species, but that one of the aims of the Forestry Area is to ‘provide an area for sustainable timber production for the benefit of the Norfolk Island community (Director of National Parks, 2018a).

The *Trees Act 1997* (NI) not only regulates the taking of protected trees, but allows for the registration of timber plantations. Where a plantation is registered under the Act, the trees can be used for the purpose of milling for timber, even where they are a protected species under the Act. In 2012, Byron reported that there were approximately 20 plantations registered under the Act. Unless a source of local pine seedlings can be made available, this situation is unlikely to change, with Norfolk Island potentially facing the future prospect of having to import more timber from overseas than it grows here on the Island.

#### 5.4.5 Action Plan for Tactic 1.4: Plan for additional pressures on water resources, transport, utilities and telecommunications infrastructure

Prioritised actions to address Tactic 1.4 are provided in **Table 9**.

**Table 9. Action Plan: Plan for additional pressures on water resources, transport, utilities and telecommunications infrastructure**

Ref	Item	Action	Priority
1.4a	Supply of rock, timber, sand and other natural resources	Employ or contract out resource planning with the aim of planning for long term, sustainable supply of rock, timber, sand, water and other essential materials in accordance with environmental best practice.	Priority 1
1.4b	Timber supply	Develop a source of Norfolk Island Pine ( <i>Araucaria heterophylla</i> ) seedlings to allow for the establishment of registered plantations under the <i>Trees Act 1997</i> (NI). Subject to proper regulations, this will allow for timber to be grown, milled and used in an environmentally sustainable manner into the future.	Priority 1
1.4c	Electric vehicles	Assess the potential for electric vehicles to form part of the solution to the problem of excess solar electricity having to be dispersed via the heater bank at the Powerhouse.	Priority 3
1.4d	Encourage active transport	Develop an Active Transport Plan to provide for footpaths, bicycle paths and mountain bike tracks to encourage green transport.	Priority 3

Ref	Item	Action	Priority
<b>1.4e</b>	Assess the airport's refuelling system	Undertake an assessment of the underground fuel hydrant system at the airport. The assessment should assess whether the hydrant system has been suitably decommissioned and whether there is land contamination present.	<b>Priority 3</b>

## 5.5 Tactic 1.5 Create a food secure community

### 5.5.1 Introduction

Norfolk Island is an isolated island with small land area (about 34 m<sup>2</sup>). Norfolk Island sells its food culture of seasonal, fresh (negligible food miles), island-grown food to the visitor market. Food is a powerful commodity in the tourism world and this product needs to be protected (Norfolk Island Government Visitor Board submission to Parliament, undated). Traditionally, all fruit and vegetables consumed on Norfolk Island were grown locally with the exception of potatoes, onions, garlic, ginger and frozen fruit and vegetables. Limited imports of fruit and vegetables protected the island from threats of introduced pests and diseases.

### 5.5.2 Agriculture

The agricultural industry on Norfolk Island provides the majority of fresh food consumed on the island, and provides employment and a contribution to the local economy. Agricultural produce includes vegetables, fruit, herbs, mushrooms, eggs, beef, pork, lamb, honey, nuts, milk and cheese. Fish are caught for local consumption, as outlined in Tactic 1.7. The population of Norfolk Island consumes significantly greater quantities of fish (24 kg/person/year) than the global average (16 kg/person/year), (Diatloff, 2008) which is unsurprising on a small, oceanic island.

Access to fresh food is provided through the Farmer's Market held every Saturday morning, various retail outlets including the local supermarkets, roadside stalls and private deliveries. In addition, the agricultural industry supplies fresh food to restaurants and food outlets across the island. Many residents grow fruit and vegetables on their land for personal consumption, and there is a culture of bartering and sharing seasonal produce on the island.

The University of Newcastle, is developing a Green Economy Blueprint for Norfolk Island, which will investigate ways to implement a sustainable food system on Norfolk Island. Stage one of the Green Economy Blueprint project is stakeholder engagement with the community. Opportunities to both increase agricultural production and diversify the range of food products produced on the island have been identified. (Michael Askew *pers. comm.*, 23 May 2018). This was recommended in the Norfolk Island Economic Development Strategy (Department of Infrastructure and Regional Development, July 2015). Diversification of available fresh food has occurred over the years with community members introducing a wide variety of fruit and vegetable plants.

There are many agricultural pests and diseases that impact on the ability of Norfolk Island primary producers to produce optimum yields. These include the army grub, which impacts cattle pastures, weeds that invade cropping land/ pastures, rats which eat vegetables and palm seed, feral chickens which scratch and eat agricultural seedlings, and many plant pathogens which kill or reduce the yield of agricultural crops.

During the course of the Norfolk Island Quarantine Survey in 2012–2014, a total of 1747 introduced plants, invertebrate pests of plants and animals, plant pathogens, pests and disease of bees, and diseases and parasites of domestic animals were recorded (Maynard *et. al.* 2018). Of these, 658 were new records for the island. This survey provided comprehensive data on plant diseases affecting agricultural plants (Maynard *et. al.* 2018). With Norfolk Island's remote location meaning that the nearest landmass 600 km away, the primary pathway for many pests and animals is via imported materials (Maynard *et. al.* 2018, Invasive Species Council, 2017). Following the 2014 completion of the



Quarantine Survey, two significant plant pests have since been detected: myrtle rust (*Puccinia psidii*); and the palm/date seed borer (*Coccotrypes dactyliperda*). These have the potential to impact on primary production, and serve to highlight the need to regularly update the Quarantine Survey as per multiple requests received during consultation on the draft Environment Strategy. One important aspect of a food secure future is good biosecurity. With the number of pests and diseases already present, primary producers might benefit from assistance to deal with these problems. In addition, some community members would like to trial new and different agricultural methods such as combining cattle grazing with forestry production. Early consultation for Council's Pest and Weed Management Plan determined that producers are already requesting assistance that would normally be available through the NSW Department of Primary Industries (N Christian, *pers. comm* 2018). Working with the NSW DPI might also allow for Norfolk Island primary producers to access education, weed alerts and other up to date advice on sustainable land management.

### 5.5.3 Preserving viable agricultural land

The public display of the draft Environment Strategy resulted in a number of submissions requesting better protection of agricultural land from fragmentation and development. Tactic 2.1 (Retain open spaces and low-density development) includes detailed information on planning and retaining open spaces/low density development. It also explains how the Norfolk Island Planning framework is structured. This section is specifically limited to the preservation of agricultural land.

The *Norfolk Island Plan 2002* (NI) defines agriculture as: *'the Use or Development of Land for general farming and includes:*

*(a) husbandry, including grazing and the keeping and breeding of livestock and bees; or*

*(b) horticulture*

*other than for the domestic needs and/or personal enjoyment of the occupants of that place. The term includes the storage on that Land of any produce resulting from that Agriculture, and it includes the Use or Development of Land for the purposes of a stable (where that Use is not Intensive Animal Husbandry).*

*The term does not include any Intensive Animal Husbandry, Forestry or Garden Centre defined elsewhere ...'.*

The *Norfolk Island Plan 2002* (NI) regulates the subdivision and development of certain land to maintain its agricultural value. For example, part A of the *Norfolk Island Plan 2002* (NI) is the Strategic Plan. The full text of the Principle Aim of the Strategic Plan is given in Tactic 2.1, and **the maintenance of the agricultural industry**, is part of that aim. In outlining how the Strategic Aim will be achieved, the following is included under 2.2 (3), when discussing the Strategic Plan Map (see **Figure 7**):

*(3) '...Much of Norfolk Island is designated as either a High Conservation/Rural Value or a Semi-Rural Preferred Dominant Land Use area. These designations are intended primarily to promote the protection of Norfolk Island's ecology, landscape, and agricultural base...'*

The objectives of the Strategic Plan do not directly articulate agriculture in the same way that open space, visual amenity and heritage qualities are discussed. However, the preservation of viable agricultural land is discussed several times within the explanation of how the objectives will be achieved, e.g. by 'requiring relatively large minimum land parcel sizes in rural areas so that viable agricultural parcels of land are retained and encouraging group or community titling practices so that

viable agricultural land is not sub-divided into small unviable parcels' (3.2.1 b); and 'maximising retention of viable agricultural land by minimising land fragmentation' (3.2.2 d).

Much of the agricultural land on Norfolk falls within the rural zone, which is shown in **Figure 8**. The intent of the Rural Zone is to:

*'(a) maintain the existing rural character of much of Norfolk Island and to provide opportunities for both agricultural and appropriate non-agricultural use or development; and  
(b) retain the existing pattern of rural land use or development and retain the large land parcels that predominate in the area covered by the zone.'*

The rural zone is subject to land-use restrictions based on the intent of the zone, and the minimum lot size is 40 000 m<sup>2</sup>. The protection of agricultural land has been included here due to community input, and Action 1.5f suggests that during the review of the Norfolk Island Plan, the protection of agricultural land be a consideration.

#### **5.5.4 Biosecurity**

Prior to July 2016, Norfolk Island was a self-governing external territory of Australia, and the government of Norfolk Island had full responsibility for biosecurity. When self-governance was rescinded, the Australian government (Department of Agriculture and Water Resources) assumed responsibility for most pre-border and border biosecurity under the *Biosecurity Act 2015* (Cth) and the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (for live animal imports). The *Plant and Fruit Diseases Act 1959* (NI) and *Animal (Importation) Act 1983* (NI) have not been repealed however the *Biosecurity Act 2015* (Cth) overrides the provisions relating to biosecurity matters.

With this change in legislation, the management of pests, diseases and pathogens that may impact the ongoing viability of food production on the island has become an important issue to the Norfolk Island community.

Cargo vessels and regular passenger aircraft are the main human-assisted pathways for introduction of pests, diseases and pathogens of quarantine concern to Norfolk Island. Casual pathways such as irregular aircraft arrivals, cruise ships and itinerant yachts pose different but still significant threats to biosecurity.

In 2016, the Ports of Ball Bay, Cascade Bay and Sydney Bay (Kingston) were determined under section 229 of the *Biosecurity Act 2015* (Cth) to be First Point of Entry (FPOE) locations. Vessels subject to biosecurity control must only enter Norfolk Island at ports that have been determined as FPOE locations. In addition, Norfolk Island Airport has been determined as a FPOE location under section 223 of the *Biosecurity Act 2015* (Cth). The purpose of the FPOE locations is to ensure that vessels/aircraft arrive at a location that has appropriate facilities and personnel to manage the biosecurity risks to an acceptable level. Council is responsible for providing appropriate facility requirements at all the FPOE locations. Council is the asset owner at the airport and the foreshore land at the landing point and bulk fuel storage tanks at Ball Bay; and the asset manager at Kingston and Cascade piers. Under the *Biosecurity Regulation 2016* (Cth), Council is therefore responsible for providing facility requirements at these locations (Australian Government Department of Agriculture and Water Resources, 2016). Inspections of imports are currently conducted by the Department of Agriculture and Water Resources at the airport and the piers. Inspections of sea freight were

previously conducted on the ship, prior to the goods being brought to shore however, for safety reasons, the goods are now brought to shore before being inspected. This presents a greater risk to biosecurity, as goods are actually on shore at the time of inspection, and a number of submissions made during the public display of the draft Environment Strategy requested that goods be inspected prior to landing them on the Island.

#### 5.5.4.1 *Importation of Fresh Produce and Plants*

Until recently, fresh food imports have been restricted to meat, eggs, dairy products, potatoes, onions, garlic, ginger and frozen fruit and vegetables. All other fresh food has been produced on the island. Restricted importation of fresh food has protected Norfolk Island from many pests and diseases that are prevalent in Australia and New Zealand.

The *Biosecurity (Prohibited and Conditionally Non-prohibited Goods—Norfolk Island) Determination 2016* (Cth) was recently made under the *Biosecurity Act 2015* (Cth) resulting in the ability to obtain a permit for the importation of a wider variety of fresh fruit, vegetables and cut flowers. While a sector of the community (some visitors included) wanted increased fresh imports, many recognise the risk the importation of fresh produce along with associated pests, diseases and pathogens, has to local food production, endemic plants and fragile species such as the honey bee.

The fresh produce import conditions are listed on the Department of Agriculture and Water Resources website and align with the *Biosecurity Act 2015* (Cth). Any importer of fresh produce or plants must:

- obtain an import permit if required
- comply with other pre-shipment import conditions, including inspections, treatments and certification requirements.

When a permit to import fresh produce or plants is submitted, a biosecurity risk assessment is conducted by the Department of Agriculture and Water Resources. The plant biosecurity pest status of Norfolk Island is based on the the Norfolk Island Quarantine Survey (NIQS), which was carried out by the Department of Agriculture and Water Resources between 2012 and 2014. The NIQS identified seven species of significant quarantine concern and a further 10 of some quarantine concern. The biosecurity risk assessments are informed by:

- international agreements and the ‘Appropriate Level of Protection’ (ALOP) set in the *Biosecurity Act 2015* (Cth)
- scientific and technical expertise.

The ALOP for Norfolk Island is ‘a high level of sanitary and phytosanitary protection aimed at reducing biosecurity risks to very low, but not to zero’. However, this risk assessment is not specific to Norfolk Island in that it does not acknowledge that many pests, diseases and pathogens found in Australia and New Zealand are not present on Norfolk Island and that their introduction poses a real risk to local food production and food security (Invasive Species Council, 2017).

#### 5.5.4.2 *Importation of Ruminants, Horses and Rootstock*

The importation of live ruminants, such as cattle, goats and sheep, is no longer allowed under the *Biosecurity (Prohibited and Conditionally Non-prohibited Goods—Norfolk Island) Determination 2016* (Cth). These animals are of importance in the local agricultural industry, with at least one local food producer producing goats’ milk for cheeses, skincare products, and farmers market products. However, Ernst and Young has recently been engaged by the Australian Government to engage with the community on biosecurity matters associated with the importation of ruminants.

Live horses can be imported from mainland Australia to Norfolk Island with few restrictions. Live horses can be imported from other selected countries only (approved by the Department of Agriculture and Water Resources) and import conditions must be met. The Biosecurity Import Conditions system (BICON) provides the import conditions for all permitted live horse imports. Importation of live horses from some countries are not permitted into Australia and therefore may not be listed in the BICON.

Currently root stock is not allowed to be imported to the island. Cuttings can be imported but should be free from foliage and only first year growth is permitted, which may impact viability. Reducing the island’s ability to diversify our plant varieties, in particular food crops, will only increase the island’s need for importing fresh produce. If Norfolk Island had the ability to import different cultivars of fruit (e.g. low chill cherries) it might allow the island to build a stronger food secure future (P Wilson, *pers. comm.* 2018).

### 5.5.5 Opportunities for improvement

A Memorandum of Understanding (MOU) to draw together the legislative and policy guidelines and to clarify the roles of Council, the Department of Agriculture and Water is necessary. With the rapid changes that have occurred in biosecurity roles and requirements, this would probably help not only stakeholders, but the wider community might also be reassured.

The current understanding is that eventually all NSW State legislation could be applied to Norfolk Island (SMEC, 2018; Invasive Species Council, 2017). While the original intention was that a raft of NSW legislation would be introduced in July 2018, the Administrator of Norfolk Island, Mr Eric Hutchinson published an update in April 2018 to say that all further introductions would be placed on hold until further notice (Hutchinson, 2018). Therefore, it remains unknown as to if or when the *Biosecurity Act 2015* (NSW) might be applied to Norfolk Island. A new principle encoded in the *Biosecurity Act 2015* (NSW) – the general biosecurity duty – offers a way of legally requiring people involved in a biosecurity matter to take responsibility for biosecurity. If applied to Norfolk Island, the Act would allow the island to be declared a Biosecurity zone. Zone specific regulations could then be used to implement a biosecurity policy and apply restrictions specific to Norfolk Island on imports. If the Act were applied to Norfolk Island, it is probable that many of the powers and responsibilities under the Act would be contracted to Council through a service delivery agreement in the same way that other State functions have been delegated.

### 5.5.6 Action Plan for Tactic 1.5: Create a food secure community

Prioritised actions to address Tactic 1.5 are provided in **Table 10**.

**Table 10. Action Plan: Create a food secure community**

Ref	Item	Action	Priority
1.5a	Pest species management	Prepare a Memorandum of Understanding to draw together the legislative and policy guidelines and to clarify the roles of Council and the Department of Agriculture and Water in biosecurity.	Priority 1
1.5b	Sustainable food production	Consult with primary producers as to how to assist with sustainable food production. Knowledge sharing, facilitating assistance from the NSW Department of Primary Industries, and providing incentives for sustainable farming might be some ways to assist primary producers, but communication is the first step.	Priority 1

Ref	Item	Action	Priority
1.5c	Pest species management	Provide a recommendation to the Commonwealth for <i>Biosecurity Act 2015</i> (NSW) to apply on Norfolk Island. If the Act is applied, declare Norfolk Island a biosecurity zone. This will allow for biosecurity protocols specific to Norfolk Island to be applied to further protect the island's agricultural sector.	Priority 1
1.5d	Food production	Implement recommendations from the University of Newcastle's Green Economy Blueprint (when available) to increase the production of supply of food for local consumption, for visitors to take home and for export.	Priority 2
1.5e	Diversify food products	Provide information and advice on the importance of the importation of ruminants and rootstock to the Norfolk Island economy and to creating a food secure future. Support the proposed review into ruminants by the Australian government.	Priority 2
1.5f	Review of Norfolk Island Plan	During the review of the Norfolk Island Plan 2002, ensure that the protection of agricultural land from fragmentation and inappropriate development is considered.	Priority 2

## 5.6 Tactic 1.6 Create a water secure future

### 5.6.1 Current situation

Water security is fundamental to the sustainability of the Norfolk Island population. There are a number of threats to water security on Norfolk Island including:

- pollution of water ecosystems
- potential increases to the resident population and visitor numbers
- inadequate water collection and storage infrastructure
- inadequate sewage treatment infrastructure
- climate change.

Securing a sufficient water supply requires consideration of several interlinked elements including by ensuring:

- that groundwater, surface water and marine ecosystems are well managed
- adequate infrastructure to support the future water needs of a growing population
- adequate infrastructure to manage sewage generated by a growing population.

Water quality and wastewater management has been addressed in Objective 1, Tactic 1.2 – Protect and Enhance Water Quality. Tactic 1.6 addresses water supply, collection, storage and climate change.

#### 5.6.1.1 Water supply and population growth

Current demand for water is met through rainwater harvesting, collection of water from freshwater springs and extraction of groundwater. The reliability of rainwater harvesting and groundwater recharge is directly influenced by rainfall. The Bureau of Meteorology has a rainfall and weather station at the Norfolk Island Airport (Station 200288). This station has recorded rainfall data since 1890 and is still in operation. The annual mean rainfall is 1312 mm with the peak of the rainfall occurring in the winter months.

There is no reticulated water supply on Norfolk Island and every person is responsible for collecting their own water supply, whether for domestic or commercial purposes. Rainwater harvesting for potable and non-potable uses is supplemented through extraction of freshwater from surface water and groundwater resources. In 2001, up to 135 000 litres of groundwater was being carted per day during the summer months to supplement existing rainwater storage volumes (Mosley, 2001), which demonstrates that the rainwater harvesting is not sufficient during certain times. Although groundwater is being used, the available supply is unknown, and groundwater quality is poor in some locations (Mosley, 2001). In 1994, a moratorium on new bores was introduced (Mosley, 2001). See Objective 1, Tactic 1.2 – Protect and Enhance our Water Quality) for more information.

The 2006 Norfolk Island Census of Population and Housing (Mathews, 2006) indicated that the majority of private homes primarily use rainwater (95.3 per cent) (see **Table 11**).

**Table 11: Use of rainwater and groundwater for domestic water supply**

Source	Number of dwellings	% of total
Own rainwater	850	95.3
Own groundwater	25	2.8
Purchased water	3	0.3
Unknown	14	1.6

The Norfolk Island community’s desire for an increased population and increased visitor numbers (Monaghan Strategic, 2016) will impact on the demand for water, not only for domestic use, but for agricultural and industrial applications. To ensure a water secure future, the natural water ecosystems on Norfolk Island must be protected and adequate water related infrastructure must be in place.

#### 5.6.1.2 Water resource characteristics

In the context of an increasing population, groundwater and surface water supplies have the potential to be impacted by increased water extraction and increased sewage generation.

The largest surface-water storage on the island is behind Watermill Dam. Other smaller storage supplies include an earth dam on Headstone Creek, and a small concrete dam on an upper tributary of Watermill Creek that provides an emergency water supply for what was previously the Norfolk Hotel. Several other small storages exist on properties with access to Watermill, Stockyard, and Mission Creeks (Abell & Falkland, 1991). In 1991, it was found that the increased demand for water had been brought on by an expansion of the tourism industry, but there is limited information on recent water consumption data to clearly identify the demand on the island.

As groundwater and surface water are limited, a precautionary approach should be taken to these water sources and access minimised through improved water collection and storage requirements, and improved management of sewage to prevent potential contamination of surface water and groundwater supplies.

#### 5.6.1.3 Water Supply Infrastructure

Council’s Development Control Plan No 2. – Water Resources (2011) provides minimum rainwater storage capacity requirements (see **Table 12**) for residential class use and development. Requirements are also provided for roof catchment areas and for plumbing, construction and materials to comply with relevant Australian Standards.

**Table 12. Minimum rainwater storage capacity requirements for new development**

Type of Residence	Minimum water storage requirement	Minimum roof area requirement
Residence - Dwelling Houses & Residence – Dual Occupancies:		
Up to & including 4 bedrooms	44,000 litres (approx. 9,700 gallons)	150m <sup>2</sup> per dwelling unit
More than 4 bedrooms	69,000 litres (approx. 15,200 gallons)	200m <sup>2</sup> per dwelling unit
Residence - Accommodation Units:		
New development	32,500 litres (approx. 7,150 gallons) per bedroom	80m <sup>2</sup> per bedroom
Extensions or changes of use	32,500 litres (approx. 7,150 gallons) per bedroom	50m <sup>2</sup> per bedroom

Some existing developments do not satisfy the water storage requirements that new developments must comply with. Although development standards are in place for water collection and storage infrastructure, no annual water balance accounting is conducted.

In addition to water storage requirements, Council’s Development Control Plan No 2. – Water Resources (2011) provides the following requirements for water conservation:

- all water closets shall be dual flush
- all showers shall have water efficient outlets fitted
- all plumbing, septic tanks, mini treatment plants and absorption/disposal systems shall comply with the AS/NZS 35001.2. 1998.

These requirements are applied to developments subject to a development application including new developments, alterations or additions, or change of uses. The requirements are assessed on a case-by-case basis during the development assessment process.

### 5.6.2 Action Plan for Tactic 1.6: Create a water secure future

Prioritised actions to address Tactic 1.6 are provided in **Table 13**.

**Table 13. Action Plan: Create a water secure future**

Ref	Item	Action	Priority
1.6a	Data collection	Collect data on water consumption (including bore water usage) to clearly identify existing water demand on the island. This should include water balance accounting to inform planning for a water secure future.	Priority 1
1.6b	Water secure education	Provide education to the community on water harvesting techniques and encourage the community to increase rainwater storage infrastructure and reduce reliance on groundwater supplies.	Priority 1
1.6c	Sustainability of freshwater resources	To inform water security planning, investigate the following: <ul style="list-style-type: none"> <li>the nature of freshwater resources, including recommended sustainable volumes for extraction</li> <li>new mechanisms for water conservation</li> <li>the feasibility of additional water infrastructure such as water storage reservoirs.</li> </ul>	Priority 2



## 5.7 Tactic 1.7 Keep our waters around Norfolk Island sustainable for the enjoyment of future generations

### 5.7.1 Current situation

The coastal zone and marine waters around Norfolk Island are some of the island's most important assets. These areas provide habitat, visual amenity, recreational opportunities, and support the tourism and fishing industries. For Tactic 1.7, the area within the exclusive economic zone (EEZ) is considered as the coastal zone and marine waters of Norfolk Island.

#### 5.7.1.1 Fisheries

Norfolk Island relies heavily on marine resources as a source of food. Thus, appropriate management of the marine ecosystem would provide benefits for the island's food security. Fisheries on Norfolk Island consist of an inshore/upper slope fishery and an exploratory offshore deep-water fishery.

The Norfolk Island Inshore Fishery Management Policy 2008 (FMP) was developed between the former Norfolk Island Government and the Australian Fisheries Management Authority (AFMA). The Norfolk Island Government (now Council) is responsible for the administration and management of the MOU in conjunction with the Norfolk Island Fishing Association. The FMP is known locally as 'fishing inside the box', referring to the 'box' of 67 × 40 nautical miles around Norfolk Island. This corresponds with the IUCN Category VI Special Purpose Zone (Norfolk) on Figure 5. The FMP is located within the Australian Fishing Zone (AFZ) as is designed to include all shelf waters around the island. Key points of the voluntary MOU include:

- that the MOU is limited to recreational and charter fishing activities in the waters surrounding Norfolk island. Commercial fishing is not considered in the MOU
- Norfolk Island residents are not required to hold a Commonwealth Concession while undertaking recreational and charter fishing within the box
- a catch limit of 45 kg of whole fish per boat per day (with a maximum of three bins per week) of trumpeter during spawning season
- no more than 12 trumpeter measuring less than 250 mm in length per boat per day
- no trawling, long lining, net fishing, fish trapping and adherence to prohibited activities as per Part 2 of the *Fisheries Management Act*
- protection of EPBC listed species, including reporting of interactions with protected species
- reporting on catch size, effort, method, fish species, non retained catch and other data.

The primary target species within the inshore fishery area is the red-throat emperor (*Lethrinus miniatus*), locally known as trumpeter. Other species caught include the bar cod (*Epinephelus ergastularius*), yellowtail kingfish (*Seriola lalandi*), red cod (*Pseudophycis bachus*) and snapper (*Pagrus auratus*).

The offshore demersal (i.e., living close to the seafloor) fishery extends 200 nautical miles from Norfolk Island, excluding the inshore fishery area, abutting the New Caledonian EEZ to the north, and New Zealand EEZ to the south. There are currently no commercial fishing concessions in the offshore fishery. Data on Norfolk Island offshore fisheries resources has been insufficient to define the nature of any ongoing commercial fishing activity. The eastern Australian tuna and billfish fisheries also target these fish on the offshore waters around Norfolk Island.

#### 5.7.1.2 Marine Protected Areas

The *Norfolk Island Marine Park* (NIMP) covers 188 443 km<sup>2</sup> of marine area surrounding Norfolk Island. The NICMR was established for the primary purpose of conserving the biodiversity found within, while

also allowing for the sustainable use of natural resources in some areas. The major conservation values for which the reserve was established to protect, include:

- biologically important areas for protected humpback whales and several migratory seabirds
- the Tasman Front – a region of intermediate productivity that separates the warm, nutrient-poor waters of the Coral Sea from the cold, nutrient-rich waters of the Tasman Sea, which supports high productivity; biodiversity and endemic species, and large aggregations of marine life
- benthic habitats thought to act as stepping stones for faunal dispersal, connecting deep-water fauna from New Caledonia to New Zealand
- examples of the unique ecosystems of the Norfolk Island Province
- benthic habitats with representative examples of banks/shoals, basin, canyon, deep/hole/valley, knoll/abyssal-hills/hills/mountains/peak, pinnacle, plateau, ridge, saddle, seamount/guyot, shelf, slope, and trench/trough environs
- one key ecological feature: the Norfolk Ridge – an area of high-productivity, aggregates of marine life, biodiversity and endemism.

The reserve is part of the *Temperate East Marine Parks Reserves Network*, which was established to provide additional protection for several species listed as endangered or vulnerable under Commonwealth legislation or international agreements, including the critically endangered east coast population of grey nurse shark and the vulnerable white shark.

The reserve includes three zoning types which are shown in **Figure 5**:

- National Park Zone (IUCN Category II)
- Habitat Protection Zone (IUCN Category IV)
- Special Purpose Zone (Norfolk) (IUCN Category VI)

Activities permissible in each of these zones are shown in **Table 14**. The blue IUCN Category VI Special Purpose Zone on **Figure 5** corresponds with the 67nm x 40nm “MoU Box” inshore fishery detailed above. The inclusion of this zone in the Norfolk Island Marine Park recognises the high value that the Norfolk community places on the conservation and sustainable use of the fishery (Director of National Parks, 2018b).

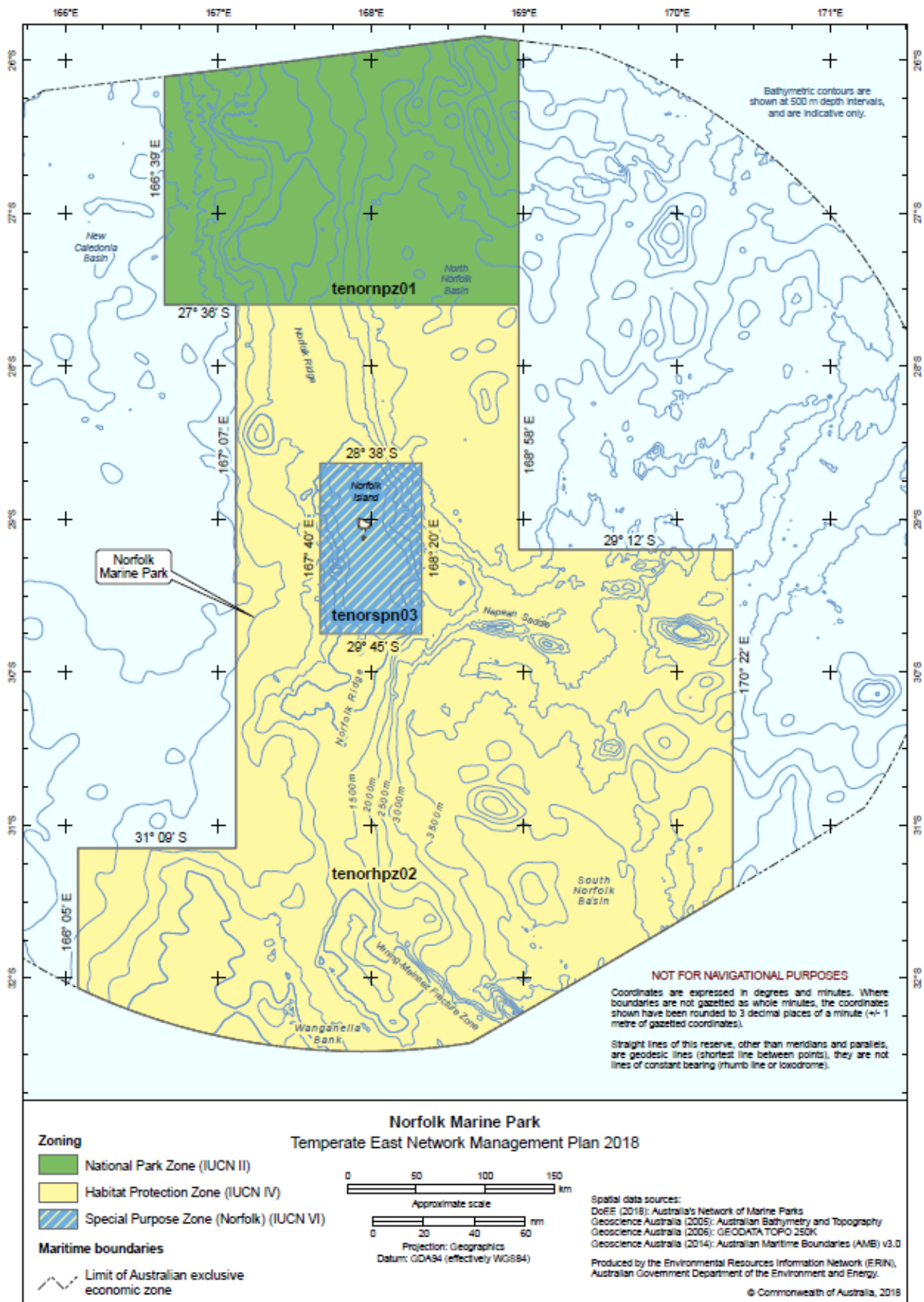


Figure 5: Norfolk Island Marine Reserve zones

**Table 14: Overview of rules for activities permissible in each marine management zone of Norfolk Marine Park**

Activity		Marine Management Zone		
		National Park Zone (IUCN II)	Habitat Protection Zone (IUCN IV)	Special Purpose Zone (Norfolk) (IUCN VI)
General use access and waste management	Ballast water discharge and exchange	✓	✓	✓
	Disposal of waste from normal operations of vessels (MARPOL)	✓	✓	✓
	Recreational use (non-fishing, nature watching, boating, etc.)	✓	✓	✓
	Non-commercial remote piloted aircraft, drones etc.	A	A	A
Commercial shipping	Anchoring	X <sup>B</sup>	X <sup>B</sup>	✓
	Vessel transiting	✓	✓	✓
Commercial fishing	Danish seine	X	X	X
	Dropline	X	A	A
	Hand collection (including using hookah, scuba, snorkel)	X	A	A
	Hand net (hand, barrier, skimmer, cast, scoop, drag, lift)	X	A	A
	Longline (demersal, auto-longline)	X	X	X
	Longline (pelagic)	X	A	A
	Minor line (handline, rod & reel, trolling, squid gig, poling)	X	A	A
	Net (demersal)	X	X	X
	Net (pelagic)	X	X	X
	Purse seine	X	A	A
	Trap. Pot	X	X	A
	Trawl (demersal)	X	X	X
	Trawl (midwater)	X	A	A
Trotline	X	X	X	
Commercial aquaculture	Aquaculture	X	A	A
Commercial media	Media	A <sup>C</sup>	A <sup>C</sup>	A <sup>C</sup>
Commercial tourism	Non-fishing related tourism (including nature watching, scuba, snorkel tours)	A	A	A
	Charter fishing tours (including spear diving tours)	X	A	A
	Commercial aviation tours (up to 3000 m above sea level)	A	A	A
Recreational fishing	Recreational fishing (including spear-fishing)	X	✓	✓
	Anchoring	✓	✓	✓
	Vessel transiting	✓	✓	✓
Mining	Mining operations including exploration	X	X	X
	Construction and operation of pipelines	A	A	A
Structures and works	Excavation (other than dredging), erection/maintenance of structures, works	A	A	A
	Dredging and disposal of dredge material	X	X	A
	Artificial reefs	A <sup>D</sup>	A	A
	Fish aggregating devices	X	A	A
Research and monitoring	Research	A	A	A
National security and emergency response	Actions by or under the direction of the Commonwealth and Commonwealth agencies – defence, border protection, law enforcement and emergency response	✓	✓	✓
	Actions by or under direction of the Commonwealth and Commonwealth agencies – not covered elsewhere by this plan	A	A	A

X Activity is not allowed.

A Authorisation required. Activity is allowable, subject to assessment.

<sup>B</sup> Anchoring is not allowed except in anchoring areas determined under r.12.56 of the EPBC Regulations.

<sup>C</sup> News-of-the-day reporting may be undertaken on terms determined by the Director from time to time, and subject to the Director being notified.

<sup>D</sup> Activity is allowable only for the protection, conservation or restoration of habitats.

[Source: Temperate East Marine Parks Network Management Plan, Parks Australia (2018)]

### 5.7.1.3 Geology

The Norfolk Island seamount (underwater mountain) chain extends in a (generally) north–south direction approximately 500 km from the Norfolk Ridge (north of Norfolk Island) to Wanganella Bank (south of Norfolk Island). The seamount is generally no more than 50 km in width, with water depths from one metre to 1500 m. Surrounding water depths are 1500+ m. The seamount supports a diversity of marine flora and fauna which are different to nearby seamounts (e.g., those of the Tasmantid Seamounts to the south). Norfolk Island and the other islands and rocky outcrops of the group (Phillip Island, Nepean Island and surrounding rock stacks) straddle the seamount and comprise an area just over 37 km<sup>2</sup>. The shelf surrounding the Norfolk Island group is 95 km long, north to south, and, 35 km wide, east to west (Geoscience Australia, 2018).

Norfolk Island is a mountain top remnant of an elongated shield volcano and consists primarily of a large elevated plateau, formed from horizontal sheets of basalt. Mount Bates is the highest point on the island at 319 m above sea level. Most of the coastline of Norfolk Island consists of cliffs, which provide one of the most distinctive landscape features of the island, and are valuable as seabird nesting sites. The cliffs are also the main area for erosion on the island, exacerbated by wind and salt burn, as well as human interference (e.g., removal of coastal vegetation) and agriculture (e.g., cattle).

### 5.7.1.4 Marine Ecology

The islands of the Norfolk Island group are situated in an area known as the Tasman Front – where the warm nutrient poor waters of the Coral Sea meet the cool nutrient-rich waters of the Tasman Sea – making the islands and surrounding marine ecosystem an integral link between tropical and temperate oceanic environments.

Norfolk Island is one of very few examples in the world of an isolated oceanic temperate island. This is reflected in its marine life, which is considered unique, even though it remains to be comprehensively categorised. Available records suggest that the marine assemblage of Norfolk Island appears more closely related to that of New Caledonia than that of eastern Australia. The assemblage includes many locally (i.e., Norfolk Island group) and regionally (i.e., sub-tropical eastern Pacific; Tasman Sea) endemic species. For most groups categorised to date, diversity is low compared to New Caledonian and Eastern Australian subtropical reefs. This is thought to be a legacy of Norfolk Island's remote location. Species diversity estimates include:

- 230 to 236 species of marine algae
- 39 to 57 species of hermatypic coral, supporting some of the most southerly coral reefs in the world
- 400 species of mollusc
- 254 species of fish
- 60 species of echinoderm
- patches of seagrass.

The waters surrounding Norfolk Island are also frequented by migratory species, many of high conservation significance. These include:

- whales – minke and dwarf minke (*Balaenoptera acutorostrata*), humpback (*Megaptera novaeangliae*), sei (*Balaenoptera borealis*), and southern right (*Eubalaena australis*)
- dolphins – orca (*Orcinus orca*), pilot (*Globicephala macrorhynchus*) and, smaller species
- marine turtles – green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), loggerhead (*Caretta caretta*) [Note: marine turtles are thought to only forage the waters surrounding Norfolk Island. No nesting sites have been confirmed, and the island has very limited nesting habitat]
- seals and penguins

- migratory seabirds (see Table 15)
- large pelagic fish, including the whale shark (*Rhincodon typus*).

The island's remote location also makes them an important habitat and breeding area for seabirds. Seabirds known to inhabit or breed on the islands are listed in **Table 15**.

**Table 15: Seabirds known to inhabit or breed in the Norfolk Island group**

Scientific name	Common name	EPBC Act listing	Range
<i>Anous minutus</i>	Black noddy	Marine	South Pacific (breeds Norfolk Island group)
<i>Anous stolidus</i>	Common noddy	Marine, migratory	South Pacific (breeds Norfolk Island group)
<i>Gygis alba</i>	White tern	Marine	South Pacific (breeds Norfolk Island group)
<i>Morus serrator</i>	Australian gannet	Marine	South Pacific (breeds Norfolk Island group)
<i>Phaethon rubricauda</i>	Red-tailed tropicbird	Marine	South Pacific (breeds Norfolk Island group)
<i>Procelsterna cerulea albivitta</i>	Grey ternlet (western)	Marine	South Pacific (breeds Norfolk Island group)
<i>Pterodroma cervicalis</i>	White-necked petrel	Marine	South Pacific (breeds Norfolk Island group)
<i>Pterodroma neglecta neglecta</i>	Kermadec petrel (western)	Vulnerable, marine	South Pacific (breeds on Phillip Island and Ball's Pyramid, Lord Howe Island)
<i>Pterodroma nigripennis</i>	Black-winged petrel	Marine	South Pacific (breeds Norfolk Island group)
<i>Pterodroma solandri</i>	Providence petrel	Marine, migratory	South Pacific (breeds Norfolk Island group)
<i>Puffinus assimilis</i>	Little shearwater	Marine	South Pacific (breeds Norfolk Island group)
<i>Puffinus carneipes</i>	Fleshy-footed shearwater	Marine, migratory	South Pacific (breeds Norfolk Island group)
<i>Puffinus pacificus</i>	Wedge-tailed shearwater	Marine, migratory	South Pacific (breeds Norfolk Island group)
<i>Sterna fuscata</i>	Sooty tern	Marine	South Pacific (breeds Norfolk Island group)
<i>Sula dactylatra</i>	Masked booby	Marine, migratory	South Pacific (breeds Norfolk Island group)

The reefs surrounding the Norfolk Island group are unique. Their location, in a tropical/temperate convergence with the alternating influence of warm and cold water, has led to the establishment of a transitional algae and coral assemblage. Previous studies have stated that the reefs are not actively accreting, but that their rates of growth are around the same paces as their rates of erosion and physical destruction (Kuster, 2001; Zann *et al.*, 2001). These marginal conditions for coral growth (in particular) suggest that the corals of Norfolk Island are declining, and it has been suggested that the ongoing degradation of the Emily Bay lagoon and surrounding marine ecosystem could result in a total loss of the coral and marine ecosystem within five to 10 years (Pendoley Environmental, 2015).

#### 5.7.1.5 Activities in the coastal zone

The coastal zone of Norfolk Island has been subject to development pressures for some time. A number of resort complexes, commercial and residential properties exist within or adjacent to the coastal zone; however, due to the island's small size, most activities undertaken on the island have, or have the potential to, exert pressure on the coastal zone and adjacent marine environment.

The coastal waters surrounding Norfolk Island are used for boating and shipping, tourism, and recreation. The sheltered lagoon of Emily Bay is an important asset to the community, used for swimming, snorkelling and tourism. These activities and locations also contribute to both the economy and wellbeing of Norfolk Island's community.

### 5.7.2 Existing management actions

The following reports include a number of recommendations to protect Norfolk Island's unique marine ecosystems:

- Norfolk Island Community Strategic Plan:
  - reduce input of nutrients into the surrounding marine environment
  - responsible recreational use of the marine environment
  - ensure protection against any potential over-fishing and drilling
  - protect and enhance water quality
  - investigate the island's water quality to identify priority management actions and inform future investment decisions.
- Norfolk Island Region Threatened Species Recovery Plan (Director of National Parks, 2010):
  - identify species most likely to be affected by climate change
  - minimise and manage human disturbance to nesting seabird populations.

In addition, the *Norfolk Island Plan 2002* contains a coastal overlay which is considered in development assessment. It provides for setbacks and other environmental factors to be considered for development within the coastal zone.

### 5.7.3 Opportunities for improvement

The following information gaps have been identified.

#### 5.7.3.1 *Algae and coral reefs*

- No information was identified detailing the status (health, distribution, abundance etc.) of the algal and coral reefs surrounding the Norfolk Island group
- Limited information exists regarding the connectivity of the Norfolk Island reefs, which is important to understand how best to manage their long-term survival
- Detailed mapping of coastal benthic environs, which is inhibiting the understanding of the status of these habitats.

See Objective 2, Tactic 2.5 for actions relating to algae and coral reefs.

#### 5.7.3.2 *Invasive marine species*

- No information was identified detailing what, if any, invasive marine species were present in the waters surrounding the Norfolk Island group. And, if present, what existing impacts were associated with these, and what are the future threats these may pose?

See Objective 2, Tactic 2.5 for actions relating to invasive marine species.

#### 5.7.3.3 *Fish resources*

- The Australian Fisheries Management Authority (AFMA) states that insufficient data exists to accurately define the sustainability of any ongoing commercial offshore fishery (outside of the Marine Park).

#### 5.7.3.4 Climate change

- No recent comprehensive climate change assessment has been undertaken to understand the impact climate change poses to the marine ecosystems of Norfolk Island.

#### 5.7.3.5 Coastal zone management

The *Norfolk Island Plan 2002* contains a coastal overlay which is considered in development assessment however there is no evidence of an established coastal zone management plan to provide ongoing management of the coastal zone.

### 5.7.4 Action Plan for Tactic 1.7: Keep our waters around Norfolk Island sustainable for the enjoyment of future generations

Actions to keep the waters around Norfolk Island sustainable for the enjoyment of future generations are provided in **Table 16**. Refer to Tactic 1.2 for information and actions on water quality and the marine environment.

During consultation on the Environment Strategy, Parks Australia (Marine Protected Areas Branch) offered to provide information and assistance towards achieving Actions 1.7a and 1.7b below.

**Table 16. Action Plan: Keep our waters around Norfolk Island sustainable for the enjoyment of future generations**

Ref	Item	Action	Priority
<b>1.7a</b>	Coastal zone management.	Prepare a Coastal Zone Management Plan that adopts a coordinated approach to the maintenance of a sustainable coastal zone and marine ecosystem encompassing appropriate management of all impact pathways such as: <ul style="list-style-type: none"> <li>• development</li> <li>• sewage and wastewater treatment and disposal</li> <li>• invasive species</li> <li>• freshwater runoff</li> <li>• land-use practices</li> <li>• erosion and sediment control.</li> </ul>	<b>Priority 3</b>
<b>1.7b</b>	Impacts of projected climate change remain to be quantified.	Commission an assessment of climate change projections for the Norfolk Island region, to determine what impacts (positive or negative) this may pose to the island's marine environment. Implement recommendations made in the assessment.	<b>Priority 3</b>



## 6 Objective 2: Preserve a Healthy Environment

Norfolk Island is ecologically and culturally unique. This remote oceanic island of only approximately 34 km<sup>2</sup> has a species assemblage, which is small in number but very high in species that are unique to their tiny home. The human history includes Polynesian settlers prior to Captain Cook's arrival, then convict settlements which were aborted prior to the population of Pitcairn Island arriving in 1856 and forming the basis of the current settlement.

Preserving a healthy environment means achieving sustainable population growth while preserving the biodiversity and culture that the community of Norfolk Island is passionate about. It is a major factor in achieving environmental sustainability.

Norfolk Island's unique biodiversity and culture provides opportunities for research and tourism but the conservation effort needs to be strategic and well-resourced to succeed.

Six tactics for achieving Objective 2 – Preserve a healthy environment, were developed in consultation with the Norfolk Island community in 2016 and documented in the Community Strategic Plan. They are presented in **Table 17**.

**Table 17: Tactics to achieve Objective 2**

<b>OBJECTIVE 2: Preserve a healthy environment</b>
<b>2.1 Retain open spaces and low density development</b>
<b>2.2 Recognise growth of the population is linked to the long-term environmental sustainability of the Norfolk Island community</b>
<b>2.3 Protect and preserve environmentally sensitive areas and those of high conservation value, through improved land management and pest control practices</b>
<b>2.4 Support threatened species and minimise the presence of invasive species</b>
<b>2.5 Ensure a healthy, diverse marine ecosystem</b>
<b>2.6 Protect and preserve vegetation communities and habitat</b>

Tactics 2.1 to 2.6 have been further developed in the Environment Strategy and actions and guidelines have been developed. These were developed based on the outcomes of community and stakeholder consultation (See Section 4) together with specialist reviews of previously prepared research reports and other background information.

In addition, actions that are important to preserving a healthy environment that align with more than one Tactic, such as cattle grazing, are detailed in section 6.7: Additional Tactics to achieve Objectives 1 and 2.

## 6.1 Tactic 2.1 Retain open spaces and low density development

### 6.1.1 Introduction

Norfolk Island has significant areas of open space, and a relatively small built-up area that forms the main township known as Burnt Pine. Formal open spaces include the Norfolk Island National Park and Botanic Garden; the KAVHA site (which includes 6 public reserves); and a further 12 public reserves including places of outstanding landscape amenity such as Anson Bay Reserve and Bumbora Reserve. Norfolk Island is also small enough that the ocean can be seen from vantage points. Views over the vast expanse of surrounding ocean contribute to the open character of the landscape. Retaining open spaces and low density development is valued by the Norfolk Island community, which is why it has been included in the CSP.

Existing open spaces are offered varying levels of legislative protection, as discussed below. Future development is governed by the Norfolk Island planning and development framework which is underpinned by The Strategic Plan (Part A of the *Norfolk Island Plan 2002* (NI)). One of the eight objectives of the Strategic Plan is to 'Provide sustainable recreational and open space opportunities'. The aim of the Strategic Plan includes the preservation of the natural environment and the landscape character of Norfolk Island. All decisions about land use and development must be made in the context of these guiding statements (*Norfolk Island Plan, 2002* (NI)).

### 6.1.2 Existing open space and retaining it for the future

Norfolk Island may have satisfactory open space to meet current requirements. However, as the population expands and vacant land is developed, landscape amenity will change, which may impact open space requirements. Open space can include reserves, National Parks, roadsides, vacant land, and other areas. These land tenures all vary in how well they are protected from development, mining, subdivision and a range of other impacts. In some cases, the community might believe that a particular open space is protected for future generations, when in reality the land may be zoned for development not compatible with open space. Therefore, legislative mechanisms must be in place to set aside and protect a sufficient amount and type of open space as per the requirements of the Norfolk Island community.

#### 6.1.2.1 *Norfolk Island National Park and Norfolk Island Botanic Garden*

The Norfolk Island National Park covers an area of 460 ha of on Norfolk Island (known as the Mt Pitt Section), and is a small remnant (<10 per cent) of the subtropical rainforest that once originally covered the island. The Norfolk Island Botanic Garden covers a further 5.5 ha of lowland subtropical hardwood forest (Director of National Parks, 2018a). In 1996, the entire 190 ha of nearby Philip Island was also proclaimed as National Park. The Park is managed as per the Norfolk Island National Park and Norfolk Island Botanic Garden Management Plan 2018–2028 by the Parks Australia under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). (Director of National Parks, 2018a). As such, these open spaces are offered a high level of protection into the future.



**Figure 6: National Park and Reserves**

### 6.1.2.2 Norfolk Island Public Reserves

Norfolk Island has a network of 18 public reserves totalling approximately 237 ha. With the exception of Nepean Island, the reserves are shown in **Figure 6**. The public reserves are mostly located around the coast and are valuable because they contain remnants of coastal vegetation that are not found in the National Park (Mosley, 2001).

The Norfolk Island Public Reserves are proclaimed under the *Public Reserves Act 1997* (NI) and most reserves are assigned a purpose such as recreation, conservation, etc. The public reserves are generally zoned Open Space or Conservation under the *Norfolk Island Plan 2002*, which regulates the activities that can be undertaken within them. The *Public Reserves Act 1997* (NI) also stipulates that each reserve will have a Plan of Management which promotes the objects of the Act: *'to protect and conserve public reserves so as to —*

- (a) promote the conservation of the natural environment and landscape beauty of Norfolk Island;*
- (b) promote the conservation of the heritage of Norfolk Island; and*
- (c) preserve the way of life and the quality of life of the people of Norfolk Island.'*

The Act also states that there shall be a Conservator responsible for managing the reserves in accordance with the Plan of Management. Prior to 2016, the Norfolk Island public reserves were Commonwealth land, and as such, they were listed on the Commonwealth Heritage List. The list recognises and protects places of significant heritage value that are owned or leased Commonwealth land. On 28 June 2016, the *Norfolk Island Land Transfer Ordinance 2016* came into effect. With the exception of the 6 reserves in KAVHA, Selwyn Reserve, Nepean Island Reserve and part of Cascade Reserve, the Ordinance specified the reserves were to be transferred to Council (formal land transfer still pending). Those reserves will therefore no longer appear on the Commonwealth Heritage List. With the exception of Middleridge, Headstone and Stock Reserves, the reserves not listed on the Commonwealth Heritage List are listed on the Norfolk Island Heritage Register under the *Heritage Act 2002* (NI).

The fact that the majority of Norfolk Island's Public Reserves are no longer listed on the Commonwealth Heritage list affects how the EPBC Act applies to the reserves. Where a matter might impact on a matter of National Heritage Significance (e.g. on a reserve that appears on the National Heritage List), this may trigger referral under the EPBC Act to allow for the potential impacts of the action to be assessed, and if necessary mitigation to be undertaken. There are still a number of other reasons why the Act might be triggered, however the fact that the reserves no longer appear on the Commonwealth Heritage List has reduced the likelihood of actions needing to be referred under the EPBC Act. Submissions received during the public display of the Environment Strategy included concerns about the ongoing protection of the Public Reserves, and the fact that a number of reserves that were once on the Commonwealth Heritage List no longer appear on this list due to the change in reserve tenure.

### 6.1.2.3 Kingston and Arthurs Vale Historic Area (KAVHA)

The KAVHA site is an area of approximately 250 ha in the southern part of Norfolk Island and includes the majority of the island's beaches and is highly valued by the community for open space, recreation, cultural values and natural history. KAVHA is of outstanding significance to Australia as a convict settlement spanning the era of transportation to eastern Australia between 1788–1855. The KAVHA site is one of 11 sites which comprise the Australian Convict Sites property that was inscribed on the

World Heritage List in 2010 (Australian Government Department of the Environment and Energy, 2018). It is significant as the only site in Australia to display evidence of early Polynesian settlement, and the place where the Pitcairn Island descendants of the Bounty mutineers were re-settled in 1856. As such, it holds special significance in the Norfolk Island community, and is the site of annual 'Bounty Day' celebrations which commemorate the landing of the Pitcairn Island community on 8 June 1856 on Norfolk Island. As a World Heritage site also inscribed on the Commonwealth Heritage List (with the exclusion of areas of freehold tenure), the open space that is the KAVHA is provided with a very high level of protection into the future.

#### *6.1.2.4 Recognising the value of private open spaces*

In addition to formal open spaces, there are various private open spaces across the island. For example, 'A Walk in the Wild', 'Pitcairn Settlers Village', 'Strawberry Fields', 'Simons Water' and the 'Wonderland by Night' property are privately owned, but have varying levels of accessibility to the public. Entry varies from completely free, to a donation, to a fee, or signing a waiver upon entry. The community may count such spaces in the quantum of current open space, but in reality they are only open at the discretion of the property owner. In some cases, the owner might want to formalise this public benefit, in a similar way that conservation covenants can be used in some Australian mainland states and local government areas. There are also some grants and concessions that are available to landholders, depending on the location and type of agreement that is entered into (NSW Office of Environment and Heritage, 2015). Norfolk Island does not currently have a simple system in place to offer this option to landowners. Such a mechanism might be considered in the future as a way to allow property owners to voluntarily protect the conservation values of their land, and to retain open spaces as per Tactic 2.1. In the past, there have been instances in which people have bequeathed land to the community of Norfolk Island, and such a conservation covenant might have assisted them in making this a smooth process.

#### *6.1.2.5 Potential mechanisms for formalisation and maintenance of open space*

NSW Councils generally have infrastructure charges or a similar system in place by which developers pay a contribution to the establishment and maintenance of public infrastructure upon which their development will increase pressure or rely upon (NSW Government Planning and Infrastructure, 2018). For example, where a subdivision results in a number of new allotments upon which dwelling houses can be constructed, the developer might make a small contribution to allow for a park to be upgraded to include a children's playground, in recognition that the increased number of houses may result in an increased need for such facilities. Other more obvious infrastructure charges include financial contributions to collectively allow for the upgrade of roads, electricity, sewerage and other infrastructure as required in proportion with the size of the development and the increased load it may place on such public infrastructure.

The Norfolk Island planning framework does not currently have a system in place for Developer Contributions, although there is provision for such in the *Norfolk Island Planning Act 2002* (NI). This can lead to inequitable outcomes for Norfolk Island developments. For example, existing electricity infrastructure may already service a number of properties that have not had to contribute to the publicly owned infrastructure. Where this infrastructure is at capacity, one further residential dwelling might require that the infrastructure be upgraded (e.g. a larger capacity transformer might be required). At present, the one development that tips the balance and triggers the necessary upgrade

is solely responsible for the expense. This is demonstrated by the following extract from the *Telecommunications Act 1992* (NI):

*Subdivider to pay for necessary alterations, etc*

22. (1) *Where it becomes necessary, in the opinion of the Administration, because of the subdivision of any land, to remove, or alter the position of, a facility on, over or under the land, the Administration may enter the land and do anything necessary or desirable for that purpose.*

(2) *The person who subdivided the land is liable to pay to the Administration the reasonable cost of anything reasonably done by the Administration under subsection 22(1) and that amount may be recovered in a Court of competent jurisdiction as a debt due to the Administration.*

A Developer Contribution scheme would resolve the situation discussed above, and the need for such a scheme it is already recognised in the *Norfolk Island Planning Act 2002* (NI), Part 6 – Developer Contribution Scheme. This sets out a framework for such a scheme, whereby a developer can make a contribution ‘towards provision, extension or augmentation of public amenities and community services directly related to needs arising from the use or development of the land’. The contribution may be payment of money, carrying out of works or dedication of land to Council. It does however, require that such a scheme be prepared, go out for public consultation, and be approved prior to being enacted. This might increase the costs of some developments, but it would mean an end to a single development being the unlucky one that has to upgrade the entire road or power line where all other developments currently serviced by that line have not had to contribute.

A Developer Contribution Scheme can be used to purchase or set aside open space, and to provide the finance required to maintain the open space (e.g. sporting fields, children’s playgrounds, nature trails, etc). This is the reason it has been included in Tactic 2.1

### 6.1.3 Planning for low density development

The mechanism for maintaining low density development on Norfolk Island lies within the Planning legislative framework. Planning is subject to both local and federal legislation. The primary legislation is shown in **Table 18**.

**Table 18: Planning legislation relevant to maintaining low density development**

Legislation	Relevance to low density development
<i>The Environment Protection and Biodiversity Conservation Act 1999</i> (Cth) (NI) ( <i>EPBC Act</i> )	This Act has been in force on Norfolk Island since 1999, and development on Norfolk Island is sometimes referred under that Act for consideration.
<i>The Norfolk Island Planning Act 2002</i> (NI) and the accompanying <i>Planning Regulation 2004</i> (NI)	Establishes the need for the <i>Norfolk Island Plan 2002</i> (NI), and the Development Approval process. The Act also provides for Development Control Plans over specific areas, which may set down further guidelines for development in specific areas.
<i>The Norfolk Island Plan 2002</i> (NI)	The principal legislation that guides the use and development activities on Norfolk Island, with land zoning, and tables of development that are permitted, permissible, permissible with consent or prohibited within each zone.
<i>Subdivision Act 2001</i> (NI)	Establishes the process for the assessment of development applications that are for the subdivision of land. Provides clarification beyond the <i>Norfolk Island Planning Act 2002</i>

Legislation	Relevance to low density development
	(NI) on the subdivision process for application, approval and registration for subdivision proposals.
<i>Community Title Act 2015 (NI)</i>	Allows for strata titling, and for land to be developed for a community setting where there are private areas and common areas.

The current understanding is that eventually all NSW State legislation could be applied to Norfolk Island following community consultation and adaptation to the Norfolk Island situation (SMEC, 2018), There is however a moratorium on the introduction of any further legislation for the foreseeable future (Hutchinson, 2018). Therefore, in the future, there may be further NSW legislation introduced which will impact on Planning and Development, and it is important that Tactic 2.1 of the Community Strategic Plan be considered during the introduction of such legislation.

#### 6.1.3.1 Part A of the Norfolk Island Plan 2002 (NI) – The Strategic Plan

The Principle Aim of the Strategic Plan is: *‘Whilst recognising that Norfolk Island is first and foremost home to its residents, to provide for development which is consistent with the protection of Norfolk Island’s natural environment, the preservation of the unique cultural and built heritage, the preservation of the character and quality of landscape experience, the maintenance of the agricultural industry, the development of a sustainable tourism industry based on Norfolk Island’s special characteristics, and the development of pleasant and functional places in which to live, work and recreate.’* The Strategic Plan sets out the intent of the community and people of Norfolk Island with respect to the long-term preferred future use, development and management of land. Amongst others, the objectives of the Strategic Plan include the following:

- Provide sustainable recreational and open space opportunities
- Promote high standards of visual amenity and protect significant landscapes; and
- Protect and enhance Norfolk Island’s environmental and heritage qualities.

These objectives are achieved through the identification of preferred dominant land-use areas designed to guide long-term use or development on Norfolk Island. The Strategic Plan is intended to control land use and development on the island. All proposals for use or development must be considered in the context of the Plan. The Strategic Plan identifies four preferred dominant land uses for Norfolk Island. These are:

- (a) *High Rural/Conservation Value Preferred Dominant Land Use*
- (b) *Semi-Rural Preferred Dominant Land Use*
- (c) *Urban Preferred Dominant Land Use; and*
- (d) *Activity Node Preferred Dominant Land Use*

As shown in Figure 7, the Strategic Plan classifies the majority of land as either High Rural/Conservation Value or Semi-Rural. Both of these preferred dominant land uses support the retention of open spaces and low-density development. For example, the objectives of the High Rural/Conservation Value Preferred Dominant Land Use are to:

- (a) *retain and enhance the open space, natural environment and wildlife habitat that is vital to life systems on the island*
- (b) *conserve and preserve areas that have very high natural and/or cultural heritage conservation values*
- (c) *allow for a very limited range of complimentary low intensity and low impact use or development in areas with very high natural and/or heritage conservation values*

- (d) maintain and protect the aesthetic backdrop for Norfolk Island*
- (e) maintain the existing rural character of much of Norfolk Island*
- (f) provide land that may buffer certain incompatible uses; and*
- (g) protect and preserve land for existing and future public, government, and Administration use or development.*

Every development application within this Strategic Planning area must be assessed within the context of these objectives, in addition to the planning requirements in Part B of the Norfolk Island Plan.

#### *6.1.3.2 Part B of the Norfolk Island Plan 2002 (NI) – Planning Requirements*

Part B of the Norfolk Island Plan is ‘Planning Requirements’ which comprise of the following that are relevant to the maintenance of open space and low density development:

- Land zoning.
- Overlay provisions, including the Coastal Environment Overlay and Buffer, the Heritage Overlay and the Obstacle Limitation Surfaces Overlay.
- General Provisions that must be considered in each application. These include provisions that are relevant to density such as the character, environment and amenity of the proposed activity. There are also further provisions for subdivision applications and plan variations (including land rezoning).

The Zoning Map of the Norfolk Island Plan is shown in **Figure 8**. Existing zones that support open space and low density development are:

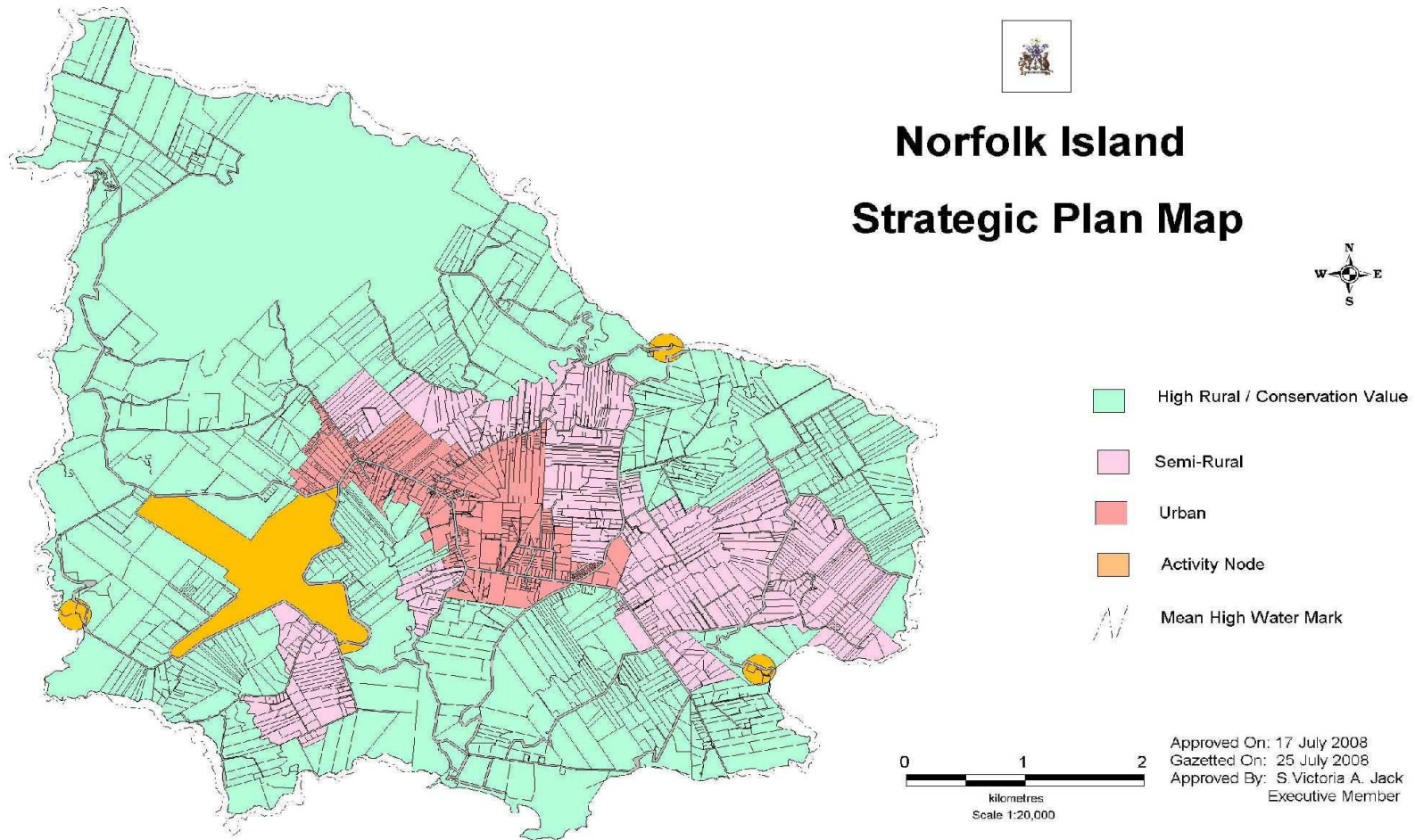
- Rural Zone
- Rural Residential Zone.
- Conservation Zone
- Open Space Zone

The Open Space and Conservation zones are largely protected from development, and the Rural and Rural Residential Zones are subject to land-use restrictions and minimum lot size restrictions (40,000 m<sup>2</sup> in the Rural Zone and 8,000 m<sup>2</sup> in the Rural Residential Zone). The preservation of these standards will help to ensure low density development is preserved into the future.

#### *6.1.3.3 Community Title Act 2015 (NI)*

The *Community Title Act 2015* (NI) has been developed to allow for individual titles to be issued for example, where more than one dwelling is developed on one block of land. The Act however does not allow for any change to the areas in which multiple dwellings are allowed. For example, a ‘Residential Care Establishment’ is currently permitted in the Rural Zone. The only difference with the new Community Title Act is that each dwelling within the establishment can be individually owned due to the titling system. Each owner would not only own the private area, but would be entitled to a share of the ‘common areas’ in the establishment. The portion of land cannot be subdivided below the minimum size for the rural zone and if the community title lots are extinguished, then all owners become ‘tenants in common’ for the large original allotment of rural land. Therefore, it is not expected that the *Community Title Act 2015* (NI) will impact on the ability to retain open spaces and low density development.





**Figure 7: Strategic Plan Map (Norfolk Island Plan, 2002)**

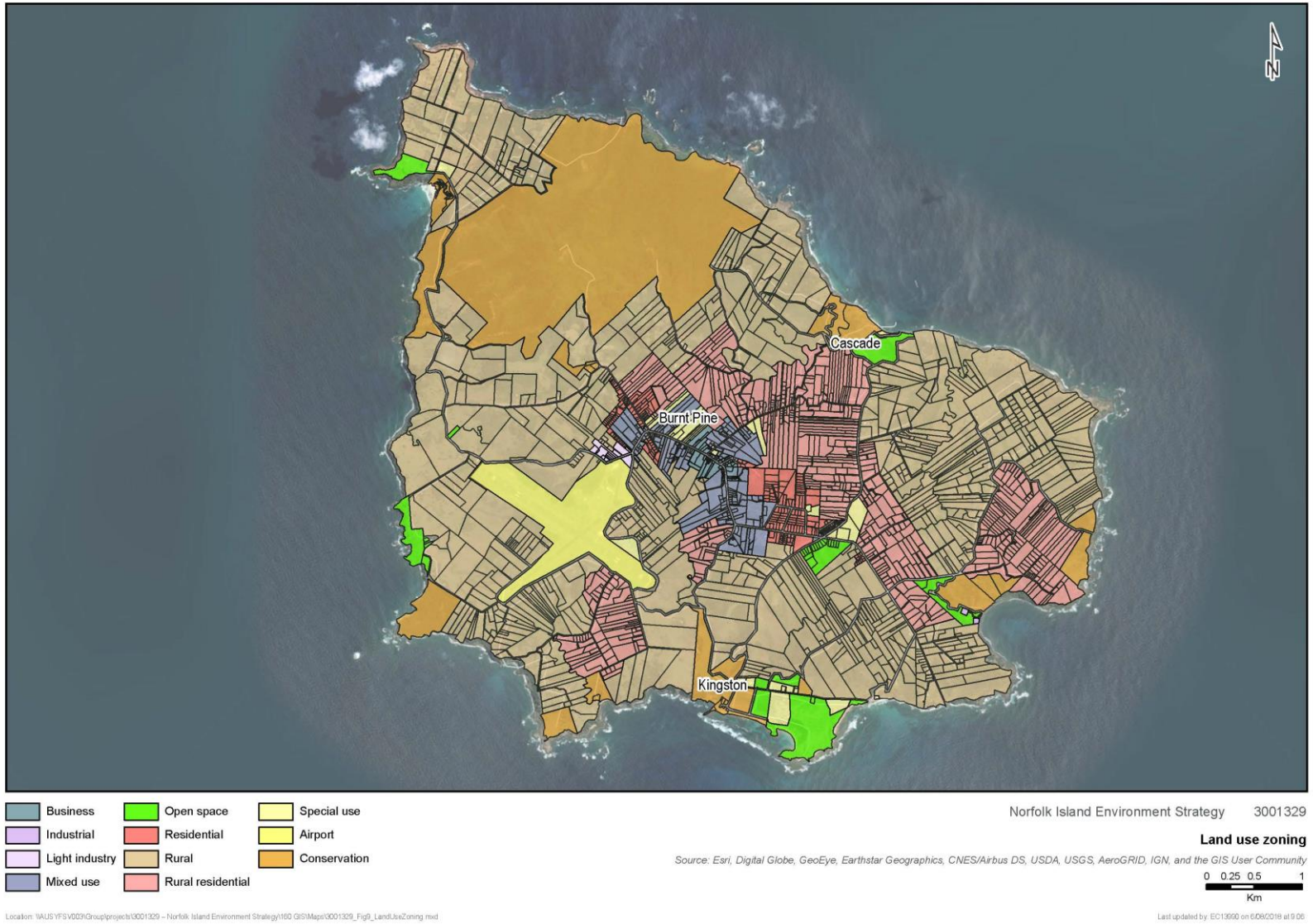


Figure 8: Land-use zoning

#### 6.1.4 Action Plan for Tactic 2.1: Retain open spaces and low density development

Prioritised actions to address Tactic 2.1 are provided in **Table 19**.

**Table 19. Action Plan: Retain open spaces and low density development**

Ref	Item	Action	Priority
2.1a	Review of Norfolk Island Plan	During the review of the Norfolk Island Plan 2002, ensure that the Community Strategic Plan Tactic 2.1 Retain Open Spaces and low density development informs the review. In particular, the preservation of minimum lot sizes in the rural and rural residential zones will help retain low density development.	Priority 1
2.1b	Development contribution scheme	Consider utilising the mechanism already present in the <i>Planning Act 2002</i> (NI) for the establishment of an equitable Development Contribution Scheme. This would allow for developers to contribute fairly toward open space establishment and upkeep, especially as the resident and visitor population increases.	Priority 2
2.1c	Voluntary Conservation covenants	Consider a mechanism for voluntary conservation covenants to be placed over land by private and public landholders. This may allow landholders to access concessions as per mainland NSW conservation covenantees, while increasing the amount of open space preserved in perpetuity. It might also offer a mechanism to offer further protection to those Public Reserves which are now no longer listed on Commonwealth Heritage list.	Priority 3

## **6.2 Tactic 2.2 Recognise growth of the population is linked to the long-term environmental sustainability of the Norfolk Island community**

### **6.2.1 Introduction**

There have been four distinct settlement phases on Norfolk Island:

1. Polynesian settlement, around 1200 AD, inexplicably abandoned around 1500 AD (Anderson and White, 2006)
2. European penal colony established in 1788, making Norfolk Island the first British island in the South Pacific. This colony was abandoned in 1814
3. Penal colony settlement from 1825, closed in 1855. Today the remains of this penal colony are a World Heritage listed cultural site (Kingston and Arthurs Vale Historic Area)
4. Current and fourth settlement which commenced in 1856, when Queen Victoria used an Order in Council to offer Norfolk Island as a new home to the descendants of the Bounty mutineers (Nimmo, 1976). The population had applied to Queen Victoria for a new home due to overcrowding where they were living in Pitcairn Island. In 1856, the newly relocated Pitcairn Island population used the abandoned second penal colony before dividing the island into 50 acre lots (KAVHA Heritage Management Plan, 2016). With them they brought a unique culture from Pitcairn Island, particularly their indigenous language; a blend of Old English and Tahitian, now endangered. Today the Norfolk Islanders retain their indigenous culture, while the community is an equally biogeographic blend of Norfolk Islanders, Australians and New Zealanders.

At the time of the 2016 Census, Norfolk Island has a population of approximately 1748 people, with a median age of 49 years (Australian Bureau of Statistics, 2016). On average, each household is made up of 2.2 people. Of the 1080 private dwellings on the island, approximately 25 per cent were unoccupied at the time of the 2016 census.

### **6.2.2 Population Regulation Prior to 2016 and the Repeal of the *Immigration Act 1980* (NI)**

Prior to 1 July 2016, Norfolk Island's population was controlled through an immigration system managed by the then Administration of Norfolk Island. Immigration was regulated under the *Immigration Act 1980* (NI) which established classifications of residency status, including permanent resident, temporary entry permit holder, and general entry permit holder.

The Policy Paper: Sustainable Growth Strategy for Norfolk Island (Government of Norfolk Island, 2013) states that these restrictive immigration policies placed a significant constraint on economic development. To this end, the Policy Paper noted the development of an Immigration and Investment Promotion Strategy to attract new migrants in both the public and private sector.

Successive Norfolk Island Legislative Assemblies endorsed a population growth target of 2 per cent per year. This target was not reached, but was set with the intention of ensuring economic growth and prosperity (Administration of Norfolk Island, 2011a). The Policy Paper: Sustainable Growth Strategy for Norfolk Island (Government of Norfolk Island, 2013) states that no long-term population target was set by the Administration, noting that population targets risk being arbitrary unless they are scientifically based upon environmental impact, affluence and the type of technology available.

The *Immigration Act 1980* (NI) was repealed in 2016, and this has reduced the level of regulation on immigration into the island. Former residents, temporary entry permit holders and general entry

permit holders are either in the process of, or already have transitioned over to becoming Australian citizens or to Australian Immigration visa holders. Under the new residency classifications, approximately 80 per cent of the Norfolk Island population are Australian citizens and 13 per cent hold New Zealand citizenship. Both groups can live and work on Norfolk Island without the need for a visa. The 2011 Norfolk Island Census showed approximately 38 per cent of the Norfolk Island population are of Pitcairn Island descent (Administration of Norfolk Island, 2011c). This is a community of people that have lived together since they first arrived on Pitcairn Island in 1790 (Hoare, 1982).

### **6.2.3 Resident and tourist population growth in an Environmentally Sustainable Community**

The new regime under the *Australian Migration Act 1958* (Cth) (NI) does not provide the population controls that the former permit system provided. It is likely that the interrelated issues of carrying capacity, scarcity of resources, particularly water, ageing population and economic development targets, especially tourism, need to be considered concurrently in relation to sustainable population growth. In the Norfolk Island context this body of scientific evidence has not been compiled. When asked what the ideal resident population of Norfolk Island should be, 74 per cent of respondents in the CSP consultation indicated a figure of 2000 to 3000 (Monaghan Strategic, 2016). This consultation included 21 meetings with a total of 113 attendees.

The tourism industry is Norfolk Island's main industry and is a major driver of the island's economy. Using expected distribution and value of visitor spending, ACIL Tasman (2012) found that 41 per cent of Norfolk Island Gross Island Product can be attributed to tourism. According to 2004–05 data (Administration of Norfolk Island, 2006), 71 per cent of all businesses and 68 per cent of private sector employment on the island were strongly associated with servicing visitors. While this data is now somewhat dated, analysis of employment share indicates that the significance of tourism-related business on the island has remained relatively unchanged (SGS, 2015). Consultation for the CSP informed respondents that the number of visitors on the island at the time of the consultation was 599. 55 per cent of respondents thought the ideal visitor population at any one time was 600 to 1000, while 41 per cent thought it should be more than 1000. This is a key issue in places like Norfolk Island where tourism is the main industry: sustainable population policy must recognise the influx of visitors at various times of the year can have environmental and other impacts.

The Norfolk Island Tourism Strategic Plan 2013–2023, prepared in 2013 and endorsed by Council in August 2016 (Resolution No. 35/16) notes that from peak visitor numbers in the early 2000s, tourism on the island has faced some decline. The Tourism Strategic Plan is designed to rebuild the tourism industry framework to provide for a greater level of self-reliance by working together to achieve success in five strategic themes:

1. increase visitor numbers arriving by air and cruise ships
2. provide an environment conducive to investment
3. seek to provide the best in our visitor experiences
4. develop sustainability, infrastructure and capacity
5. build employment capacity and skill within the sector.

Rebuilding the tourism industry will assist Norfolk Island in many ways, and it is clear that the growth of the visitor and resident population is linked to the long-term viability of the community. That said, the environmental carrying capacity of the island needs to be established. This can then inform a sustainable population policy, to enable Norfolk Island to become 'An Environmentally Sustainable Community' (CSP Strategic Direction 1, 2016). A sustainable population policy is due to be developed by Council in 2019 as per Action 2.2.1 of the Norfolk Island Operational Plan 2018–2019.

**6.2.4 Action Plan for Tactic 2.2: Recognise growth of the population is linked to the long-term environmental sustainability of the Norfolk Island community**

Prioritised actions to address Tactic 2.2 are provided in **Table 20**.

**Table 20. Action Plan: Recognise growth of the population is linked to the long-term environmental sustainability of the Norfolk Island community**

Ref	Item	Action	Priority
2.2a	Sustainable resident and tourism population	Conduct a scientifically based assessment of the environmental carrying capacity of Norfolk Island, including residents and visitors. This assessment could be used to inform the sustainable population policy being developed by Council in 2019 (action 2.2.1 of the Norfolk Island Operational Plan 2018–2019).	Priority 1

## **6.3 Tactic 2.3 Protect and preserve environmentally sensitive areas and those of high conservation value, through improved land management and pest control practices**

### **6.3.1 Current situation**

Since human settlement, Norfolk Island's environmental sensitive areas such as creeks, wetlands and forested lowland areas have been heavily modified. However, while much of the area outside the National Park has been subject to clearing, grazing, pest/weed invasion and development, there are still valuable pockets of forest and habitat across the island. The National Park (Mt Pitt Section) may be the most substantial remnant of forest left on Norfolk Island, but the 465 ha it occupies includes some cleared and weedy areas, and it lacks a number of the habitats still found on the lowlands and the coast. Even within the National Park, certain areas are of greater value than elsewhere due to their scarcity and ability to support species on the brink of extinction.

Many of Norfolk Island's endemic and threatened species have specific habitat requirements. For example, the critically endangered Norfolk Island Euphorbia (*Euphorbia norfolkiana*) is at risk of extinction as it requires semi shaded coastal forest. This habitat is no longer common on Norfolk Island, and therefore, is of high conservation value. The Green Parrot uses tree hollows for nesting, and some plants in certain vegetation communities will more readily produce hollows. The habitat of the endangered King Fern (*Marattia salacina*) and critically endangered Mountain Procris (*Elatostema montanum*) is the moist, shaded gullies of the National Park. These are under the protection of the Park, but should be identified as high value areas to assist land managers in allocating funding for weeding and rat control to where it is most needed. The native Coastal Bindweed (*Calystegia soldanella*) inhabits Norfolk Island's low growing beach dune vegetation. Over the years, this vegetation community has been modified, with this species now feared extinct on Norfolk Island (Unpublished flora survey, Christian, N., 2017 and Mills, 2017).

The first step in preserving and protecting environmentally sensitive/ high conservation value areas is to identify where they are. In order to allocate conservation funding to environmentally valuable areas, we need to establish their location and extent. Council already has good soil mapping data, and together with vegetation mapping, this would form the basis of such a map. Council could then use this map to set management targets. For example, a target might be to undertake weed control in some of the most valuable areas of the public reserves, and if the extent of such areas is known, progress monitoring could be undertaken. This mapping should be undertaken in a manner consistent with Australian federal government mapping, to allow Norfolk Island to then apply for federal funding to preserve those vegetation communities. This information is also needed to develop an appropriate monitoring program to enable reporting on the State of the Environment. The required data set needs to include all of the islands in the group and not just Norfolk Island, as there are species and environments that are distinctive to different islands or have become extinct on some islands and would need to be reintroduced if ecosystems were to be restored. Understanding what resources occur across all of the Norfolk Island Group is essential for effective long-term conservation management planning.

Good biosecurity is a key part of protecting high value environmental areas. This is borne out by the damage that has already been done to Norfolk Island's biodiversity by invasive species. For example, the Argentine ant (*Linepithema humilis*) is one of the world's worst invasive species, having spread from its native habitat in South America to establish populations on six continents and many oceanic

islands. The Argentine Ant was first identified on Norfolk Island in 2005. It remains unclear exactly how and when the ant arrived on the island, but it had undoubtedly been present for many years prior, and most likely arrived with goods either from New Zealand or Australia (Hoffman, 2017). Council is committed to continuing with the island wide program to treat Argentine ants, which commenced in 2008. Two stand-alone plans have been used to guide efforts so far:

1. Thomas, B. and Davidson, P. (2015). *Argentine Ant Eradication Strategy Norfolk Island 2015–2020*. Administration of Norfolk Island, Norfolk Island; and
2. Hoffmann BD (2017) *Argentine Ant Eradication Strategy, Norfolk Island, 2017–2018*. Report to the Norfolk Island Regional Council. CSIRO, Australia.

A number of infestation zones are thought to be free of ants, subject to final confirmation. Norfolk Island's biosecurity regulations are the first line of defence against potential future introduction of other invasive animals, plants and diseases. Preventing the introduction of such species is obviously preferable to trying to manage them after arrival.

A number of other invasive species are present on Norfolk Island and are causing serious environmental harm. Alongside Argentine ants, the main problem species include feral cats, rats and chickens. Many other species are also present including the Crimson rosella, Asian house gecko, Army grub and Asian paper wasp. Council has commenced a Pest Management Plan, which will address the long-term management of invasive animal species and weeds. Further information about weed species can be found in Tactic 2.6 (Protect and preserve vegetation communities and habitat).

Rats attack and eat native fauna and eat the seed of native vegetation, potentially preventing the regeneration of some rare plant species. They are particularly problematic in the National Park. The Anson Bay community rat baiting network aimed to create a network of rat baiting stations along property boundaries in the Anson Bay area, demonstrating the strong community support for rat control.

Cats prey on the local fauna, particularly birds. A 2017 survey to examine issues with cats on Norfolk Island provided the results that 69 per cent of respondents were in favour of the option to allow continued cat ownership under controlled conditions. The controlled conditions included registration, microchipping and desexing (many respondents called for a subsidised program) of domestic cats. It was also noted that any reduction or ban of cats would have an impact on increasing the population of rats on the island.

To highlight the value of feral animal eradication, Norfolk Island ranked 11 out of 20 for islands less than 1000 km<sup>2</sup> in terms of the conservation benefit to threatened birds arising from the eradication of alien vertebrates from those islands (Brooke et al., 2007). Council is currently developing an integrated Pest and Weed Management Plan, which will detail management priorities and techniques for invasive animal species.



### 6.3.2 Action Plan for Tactic 2.3: Protect and preserve environmentally sensitive areas and those of high conservation value

Prioritised actions to address Tactic 2.3 are provided in **Table 21**.

**Table 21. Action Plan: Protect and preserve environmentally sensitive areas and those of high conservation value**

	Item	Action	Priority
<b>2.3a</b>	Identification and management of Sensitive and High Conservation Value Areas	Using the formal GIS vegetation mapping recommended in Action 2.6a, undertake a review of the mapped natural assets to identify environmentally valuable areas such as habitat for threatened species.	<b>Priority 1</b>
<b>2.3b</b>	Education	Develop and implement a high profile, informed, adapted (to local circumstances) information / education program to increase understanding of the reasons and benefits to both the environment and human activities on the island, of managing land for biodiversity.	<b>Priority 1</b>
<b>2.3c</b>	Pest and weed management	Continue with the development of a pest and weed control plan for Norfolk Island.	<b>Priority 1</b>
<b>2.3d</b>	Private landholder assistance	Provide support and incentives for private land managers who are protecting and preserving valuable environmental areas. Support could include expert advice, assistance with grant applications and hire or loan of cat traps and similar equipment.	<b>Priority 1</b>
<b>2.3e</b>	Restoration of high value areas	Using the maps identifying high value conservation areas, undertake ecological restoration including weeding, replanting and cattle exclusion.	<b>Priority 2</b>
<b>2.3f</b>	Cat management	Phase in registration, microchipping and subsidised desexing of pet cats, as per the strong community demand for this shown in the 2017 'Cat Survey'.	<b>Priority 2</b>

## 6.4 Tactic 2.4 Support threatened species and minimise the presence of invasive species

### 6.4.1 Current situation

Norfolk Island has a high proportion of endemic plants and animals (i.e. species that are unique to Norfolk Island). This includes 43 plants (almost one quarter of the native flora), 15 birds (species and subspecies), and an unknown number of invertebrates. Additional species, including two lizards and a number of plants are restricted to the Norfolk Island and Lord Howe Island groups. Of Norfolk Island's flora and fauna, 58 species are listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth): 46 plants, five birds (four land birds and one seabird), two reptiles and five land snails (Director of National Parks, 2010). The Norfolk Island Green Parrot is probably the best known of the endangered species and has been subject to ongoing recovery actions, even including an attempt to establish a population on Phillip Island.

A number of bird species are already extinct including the Norfolk Island Kaka, Norfolk Island Pigeon, White-chested White-eye and Tasman Starling. In addition, the Norfolk Island Morepork owl only exists as hybrid; the result of a rescue program where males from a closely related New Zealand subspecies were brought in to mate with the last remaining female Norfolk Island Morepork owl. It also appears very likely that the Norfolk Island Freetail-bat is probably extinct and the same may now be true of Gould's Wattle Bat. Approximately eight native plant species are thought to be extinct from the island. While five are found elsewhere, three are now presumed extinct from the planet (Mills, 2017): Phillip Island Glory Pea (*Streblorrhiza speciosa*), Bridal Flower (*Solanum bauerianum*) and a Spider Orchid (*Corybas (Nematoceras?) acuminatus*<sup>2</sup>). The loss of less obvious invertebrate species is unquantified and a number of endemic land snails are now listed as critically endangered (Invasive Species Council and Island Conservation, 2017).

The recovery of threatened species depends largely upon the preservation of the habitat they need in which to live and reproduce. Threatened birds for example may require particular vegetation types, tree hollows or undisturbed cliff areas. Threatened plant species may need native coastal forest and may not be able to thrive in disturbed, weedy forests. The preservation of such habitat is fundamental to the survival of such plants and animals, and is discussed in under Tactic 2.6 (Protect and preserve vegetation communities and habitat). Where this habitat is located in Council managed land, Council can support threatened species by protecting and restoring such habitat. If this is beyond Council's resources, then external funding might be considered.

Some of Norfolk Island's plant species are so endangered, they require direct assistance to aid their recovery. This includes critically endangered species such as Norfolk Island Euphorbia (*Euphorbia norfolkiana*), Norfolk Melicytus (*Melicytus latifolius*), Mountain Procris (*Elatostema montanum*), and others. Council is the land manager of a number of reserves that contain the last remaining populations of critically endangered plants such as the aforementioned Norfolk Island Euphorbia. While the best long-term option is to exclude cattle and restore the areas around these populations, this is resource intensive as it requires long term, ongoing weed control. A full discussion of cattle grazing is presented in Section 6.7.1.3. The cheapest short-term option for supporting these populations is to propagate them and replant into areas where they are protected from cattle grazing

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<sup>2</sup> There is some question over the genus of the extinct Spider Orchid, hence the use of the question mark in the scientific notation (Mills, 2016)

and where woody weeds and other problems are actively managed. Propagation materials such as seeds and cuttings need be gathered to allow such species to be propagated in a nursery environment prior to replanting into their appropriate vegetation community. During consultation for the Environment Strategy, Parks Australia expressed their interest in working collaboratively with Council to achieve shared environmental outcomes. With Parks Australia having recently secured some funding for the Nursery, there is potential for Council to collaborate on this initiative, particularly as Parks Australia is willing to oversee the operation. This would be a cost effective way to source endangered plants for replanting into Council managed land. This is discussed further under Tactic 2.6.

Tactic 2.4 is 'Support threatened species and minimise the presence of invasive species'. Invasive animal species and weeds have a huge impact on threatened species. To avoid duplication of information, pest animal management is discussed under Tactic 2.3 (Protect and preserve environmentally sensitive areas and those of high conservation value, through improved land management and pest control practices). Weed management is discussed under Tactic 2.6 (Protect and preserve vegetation communities and habitat).

Baseline survey data is needed to accurately assess and monitor the status of threatened species which then determines management techniques. Currently, there are very few high quality, quantitative surveys upon which management actions can be based. While Council may not have the resources to carry out such baseline studies, Parks Australia is willing to share their threatened species baseline and monitoring data where Council is willing to work collaboratively to do so. Another option to gather such data is to encourage students and scientists to carry out research on Norfolk Island (see 6.7.1.1 for more information). This baseline information would allow Council to measure the effects of management actions, which may assist in funding applications.

The Norfolk Island Region Threatened Species Recovery Plan (the 'Recovery Plan') outlines the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) requirements for the management of these nationally listed species. Many of these species are found in the Norfolk Island National Park and Botanic Garden, which is managed by Parks Australia. A number of species including threatened coastal plants are found outside the National Park. Council manages most of the coastal reserves, and is responsible for ensuring management aligns with the requirements of the Recovery Plan. The proposed actions in the Recovery Plan are aimed at the removal/control of pest species, recovery and reconnection of habitats and the re-introduction of species to areas/islands in which they have become extinct. It also provides some guidance on actions to manage the region's seabirds (Director of National Parks, 2010).

In order to measure the success of threatened species recovery work, monitoring is needed. This is particularly important to demonstrate management success when applying for external funding. Monitoring is resource intensive, and proper monitoring is beyond the resources of Council. However, if Council works collaboratively with Parks Australia and community organisations, it is achievable. In addition, a research station on the island might encourage scientists to visit for monitoring work, as outlined in section 6.7.1.1. These sources of monitoring information have been collated in the State of the Environment Report in Section 7.

#### 6.4.2 Action Plan for Tactic 2.4: Support threatened species and minimise the Presence of Invasive Species

Prioritised actions address Tactic 2.4 are provided in **Table 22**. Related actions can be found addressing Tactic 2.3 (Protect and preserve environmentally sensitive areas and those of high conservation value conservation value) in **Table 21**.

**Table 22: Actions to support threatened species and minimise the presence of invasive species**

Ref	Item	Action	Priority
2.4a	Baseline survey	Collaborate with Parks Australia, students and scientists to undertake baseline surveys to determine the population status of threatened species	Priority 1
2.4b	Habitat restoration	Restore and maintain vegetation communities that represent habitat for threatened species and protect these from cattle grazing.	Priority 1
2.4c	Monitoring	Collaborate with Parks Australia and community organisations to monitor the success of biodiversity management. Monitoring includes threatened species management, restoration of environmentally sensitive areas, habitat restoration and revegetation work.	Priority 2
2.4d	Biodiversity Management Plan	Develop a Norfolk Island Biodiversity Management Plan that sets clear targets to manage the terrestrial biodiversity of the Norfolk Island group.	Priority 2
2.4e	Threatened species	Consider a re-introduction program for native species lost from parts of the Norfolk Island group or from Lord Howe Island	Priority 2

## 6.5 Tactic 2.5 Ensure a healthy diverse marine ecosystem

### 6.5.1 Current situation

The marine ecosystem around Norfolk Island is considered one of the Island’s most important assets. The area provides habitat, visual amenity, and recreational opportunities, and supports the tourism and fishing industries. For Tactic 2.5, the area within the exclusive economic zone (EEZ) was considered as the marine ecosystem, as the impacts of human habitation on the island could extend this far.

Tactic 1.7 provides further information on the current situation of the marine ecosystem.

During consultation on the Environment Strategy, Parks Australia (Marine Protected Areas Branch) offered to work with Council and the Norfolk Island community to achieve all of the actions in the Action Plan for Tactic 2.5, including:

- working with Council and the Norfolk Island community to better understand species diversity and distribution, ecosystem and oceanographic processes and threats to the Norfolk Island marine ecosystem
- research, surveys and monitoring of the marine ecosystem
- education and communication to increase awareness of the marine ecosystem to Norfolk Island residents and visitors.

### 6.5.2 Action Plan for Tactic 2.5: Ensure a healthy diverse marine ecosystem

Prioritised actions to address Tactic 2.5 are provided in **Table 23**. Related to this are the prioritised actions to address Tactic 1.7 (Keep our waters around Norfolk Island sustainable for the enjoyment of future generations), which are provided in **Table 16**.

**Table 23. Action Plan: Ensure a healthy diverse marine ecosystem**

Ref	Item	Action	Priority
2.5a	Determine status of algal and coral reefs, ecosystem processes and interactions.	<p>A management framework should be established to identify and prioritise research areas required to fill gaps in knowledge on the marine ecosystem of Norfolk Island.</p> <p>While the algae-coral dominate reefs of Norfolk Island have been studied, they remain to be comprehensively categorised. Surveys should be undertaken to quantify, for example:</p> <ul style="list-style-type: none"> <li>• species diversity and richness, and patterns of temporal and spatial distribution</li> <li>• ecosystem processes (e.g., nutrient cycling)</li> <li>• oceanographic processes</li> <li>• concentration of contaminants and pollutants.</li> </ul>	Priority 1
2.5b	Develop an integrated management approach.	<p>Integrate the management of Norfolk Island’s marine ecosystems with other relevant management plans for example:</p> <ul style="list-style-type: none"> <li>• water quality management and monitoring</li> <li>• land-use management</li> <li>• sustainable development</li> <li>• invasive species.</li> </ul>	Priority 1
2.5c	Enhance community and stakeholder	Implement an education campaign to increase awareness of the marine ecosystem of Norfolk Island,	Priority 2

Ref	Item	Action	Priority
	appreciation of the marine ecosystem.	and how they can assist in minimising these, or be involved in monitoring (community science).	
<b>2.5d</b>	<p>Presence of invasive species not known.</p> <p>If present, impacts of invasive species not known.</p>	<p>Undertake invasive marine surveys in accordance with the National System for the Prevention and Management of Marine Pest Incursions, and Australian Marine Pest Monitoring Manual.</p> <p>Research programs need to be established to provide a better understanding of interactions and seasonal changes within the bays, before limitations can be placed on any activity.</p>	<b>Priority 3</b>

## 6.6 Tactic 2.6 Protect and preserve vegetation communities and habitat

### 6.6.1 Current situation

Norfolk Island was densely forested when Europeans first arrived in 1774 (Director of National Parks, 2018a). Since that time, clearing for agriculture, timber harvesting, cattle grazing and for development has led to the fragmentation and loss of the majority of the native vegetation. Norfolk Island's remaining native vegetation varies with altitude, topography, aspect and proximity to the sea. Vegetation communities vary distinctly according to their setting, for example the Valley Palm Forests in the National Park are a different vegetation community to the Ridgetop Pine and Hardwood forest. Coastal Pine and White Oak forest that is present in Council Reserves such as Hundred Acres Reserve are again, a different vegetation community. The Norfolk Island National Park (Mt Pitt Section) is the largest substantial remnant of native vegetation left and it contains a relatively small number of vegetation communities (Gilmour and Helman, 1989). The National Park is of outstanding value to the plants and animals that are suited to these vegetation communities. However, it doesn't include suitable habitat for vegetation communities that depend upon wetlands, coastal beaches or lowland soils, as these features aren't represented in the National Park. Some of the features and corresponding vegetation types absent from the National Park can be found in the island's 220 ha (excluding Nepean Island) of public reserves. Others can be found on privately owned land where local landholders have preserved, and in some cases restored, such vegetation.

There appears to be no available estimation of the extent of vegetation that is remaining or its quality, greatly hindering the understanding of the best approaches to management or management targets that are achievable. The only detailed information available on the extent of native vegetation is for the Norfolk Island National Park and Norfolk Island Botanic Garden that covers an area of 465 ha on Norfolk Island and 190 ha on Phillip Island. However, even this area is subject to disturbance with only 30 per cent of the area considered to be native forest in 1989 (Gilmour and Helman, 1989). The vegetation needs to be systematically surveyed and mapped and this information recorded on a Geographical Information System to provide a baseline for future measurement. Areas identified in this process as of specific interest in containing vegetation communities of specific importance can then be assigned priority for conservation and management. This mapping should be undertaken in a manner consistent with Australian federal government mapping, to allow Norfolk Island to then apply for federal funding to preserve those vegetation communities, e.g. Australia's 20 Million Trees program.

There is currently nowhere to purchase native plants on Norfolk Island. The once active native plant nursery managed and run co-operatively by the former Norfolk Island Administration and the Norfolk Island National Park no longer provides plants for sale. Parks Australia has recently secured a grant to fund a part time position at the nursery. The lack of availability of native plants is a significant issue as it limits ability to undertake regeneration projects outside the National Park. It is recommended that Council work collaboratively with Parks Australia to support the reestablishment of the nursery.

Cattle grazing is a threat to native vegetation communities, as cattle eat and trample such vegetation. Grazing is a common practice in the public reserves, reducing their biodiversity value (Administration of Norfolk Island, 2003). If grazing is reduced in some areas and followed up with weed control and replanting, restoration of vegetation communities is possible. Without follow up weed control and replanting, cattle exclusion often results in woody weed regrowth. With good mapping, restoration

could be directed to high conservation value areas, and cattle grazing could be restricted to other areas.

One of the most serious threats to native vegetation communities is the presence of weed species. A better understanding of the extent and location of weed infestations would allow land managers to prioritise areas for weed control. If vegetation mapping were undertaken, it could capture the level of weed invasion for this purpose. Invasive weeds, however are a major problem not only in the remaining vegetation communities, but in cleared areas where cattle exclusion is not followed up with weed control. While the native flora is made up of approximately 175 native species, there are over 400 species of introduced plants (Australian Government Department of Agriculture, 2014), some of which have become serious weeds. Weed control is essential for the protection and preservation of Norfolk Island’s vegetation communities. Priority invasive weed species include:

- Hawaiian holly (*Schinus terebinthifolius*)
- Red guava (*Psidium cattleianum* var. *cattleianum*)
- African olive (*Olea europaea* subsp. *africana*)
- Lantana (*Lantana camara*)
- William Taylor (*Ageratina riparia*)
- Pohutakawa (*Metrosideros kermadecensis*)
- Wild tobacco (*Solanum mauritianum*)
- Formosa lily (*Lilium formosanum*)
- Morning glory (*Ipomoea cairica* and *I. indica*)
- Madeira vine (*Anredera cordifolia*)
- Coral berry (*Rivina humilis*)
- Water Hyacinth (*Eichornia crassipes*)
- Cascade onion (*Homeria flaccida*)
- African boxthorn (*Lycium ferocissimum*)

The *Noxious Weeds Act 1916* (NI) lists only a small number of Norfolk Island’s most problematic weeds, and needs updating so that Council has a legislative head of power with which to implement weed control.

Norfolk Island had an active Landcare group for several years up to around 2016 (SMEC, 2018). Norfolk Island Landcare undertook bushland restoration work in a number of the public reserves including Cascade Reserve, Anson Bay Reserve and a number of the reserves in KAVHA. Norfolk Island is unable to access Landcare funding as it does not belong to an Australian Natural Resource Management Region (Nias, 2013). It is therefore recommended that the option of joining an NRM region be investigated, as this may assist with funding restoration, and in bringing the Norfolk Island community together to work on public land again as a Landcare organisation.

### 6.6.2 Action Plan for Tactic 2.6: Protect and preserve vegetation communities and habitat

Prioritised actions to address Tactic 2.6 are provided in **Table 24**.

**Table 24. Action Plan: Protect and preserve vegetation communities and habitat**

Ref	Item	Action	Priority
2.6a	Vegetation Mapping	Undertake formal GIS vegetation mapping for Norfolk Island, to quantify the extent of native vegetation, and the various vegetation communities present. This mapping needs to be undertaken to be consistent with	Priority 1



Ref	Item	Action	Priority
		Federal Government mapping to assist with grant applications for environmental funding.	
2.6b	Native Plant Nursery	Provide support for the reestablishment of the Native Plant Nursery. Parks Australia is leading this project and is willing to work collaboratively with Council, for example to allow Council access to plant stock for replanting in public reserves.	Priority 1
2.6c	Staff resources	Attract and recruit a sufficient quantity of qualified casual, part time or full-time staff to undertake pest and weed control in the public reserves and other public land as per the targets set down for restoration and replanting of important vegetation communities.	Priority 1
2.6d	Bushland restoration	Undertake strategic bushland restoration in the public reserves, setting targets to increase the area of native vegetation established by the vegetation mapping project, and/or to reduce the number of weeds present in these areas.	Priority 1
2.6e	Revegetation and Community Landcare	Determine whether Norfolk Island can become a Natural Resource Management (NRM) region so as to access assistance as part of Australia's Landcare community.	Priority 2
2.6f	External funding	Using the vegetation mapping (prepared consistent with Australian Federal mapping), seek assistance for restoration of mapped vegetation communities.	Priority 2
2.6g	Noxious weeds	Amend the <i>Noxious Weeds Act 1916</i> (NI) to update the list of scheduled weeds, which is currently out of date.	Priority 3

## 6.7 Additional Tactics to Achieve Objective 1 and 2

The Environment Strategy has been structured according to the thirteen Tactics that support Objectives 1 and 2 of the Community Strategic Plan. However, the community consultation and literature review determined that there were additional actions that could be employed to achieve Objectives 1 and 2. These are discussed below, and the subsequent actions are provided in **Table 25**.

### 6.7.1 Current situation

#### 6.7.1.1 Research station

The Norfolk Island Group is a biodiverse island environment with a large number of endemic species that is located at the junction of tropical and temperate ocean conditions. Given this location and the impacts of land clearing and introduced species, the location represents an opportunity to develop a research station along the lines of that at Lord Howe Island. The research station could be used to draw researchers from around the world to investigate fundamental questions in regard to speciation as well as the means to manage island populations that are subject to human impacts. Managing island environments that typically develop important endemic biodiversity is a significant issue across the world and Norfolk Island can play a role in developing effective control programs for introduced species and for ecosystem restoration after significant long-term impacts. Such a station would provide income through its use by scientists and can provide further opportunities for ecotourism as volunteers are needed to assist in research programs and will require accommodation.

#### 6.7.1.2 Soils and contamination

Land contamination (soil, sediments, surface water, groundwater, air) can have significant adverse impacts on human health, flora and fauna, and contaminated waste is difficult to dispose of. Targeted contamination assessment of the Tanalith timber treatment plant was conducted by AECOM in 2017.

Numerous surface and groundwater assessments targeting *E. coli* impacted surface water and groundwater have been conducted. No additional contamination or leachate impact indicators were analysed.

The available information indicates the following sites may require further investigation for land contamination:

- Tanalith Plant, timber treatment facility
- three former landfills
- airport
- power generation unit/s
- fuel farm/s (fuel tank storage areas)
- mechanics yards
- fire station
- fire training areas
- Waste Management Centre (storage of hazardous goods)
- residential small-scale septic systems
- cattle dipping stations
- Water Assurance Scheme including STP
- previously identified nutrient impacted groundwater.

Contaminants of concern may include faecal coliforms, poly-fluoroalkyl substances (PFAS), heavy metals, solvents, nutrients, total petroleum hydrocarbons, phenols, polychlorinated biphenyl (PCB), Asbestos, methane, excessive biochemical oxygen demand (BOD) and pH.

Depending on the actual presence, degree and extent of contamination of soil, sediments, groundwater and surface water, individually and/or in combination these contaminants could pose considerable adverse impacts where exposure occurs, e.g. groundwater use, groundwater discharge to surface water bodies, flora and fauna in affected soils and sediments, the human food chain, and others.

A staged land contamination assessment would be required in order to assess actual risks to human health and flora and fauna from contaminated land and to establish a risk-based management approach. This might commence with preliminary site investigation, with further investigation as required.

#### *6.7.1.3 Cattle grazing on public land and unfenced private land*

Cattle grazing on public lands, including roads and reserves is a long-term tradition on Norfolk Island, having cultural significance to cattle owners and other members of the community (GHD, 2016). Where landowners do not fence cattle out, the public herd are able to access private land. Therefore, landowners wishing not to have cattle grazing on their land are responsible for cattle exclusions fencing. Cattle are important to the local beef supply and form part of Norfolk Island's cultural backdrop. Without proper management, however cattle grazing can lead to land degradation, loss of native plant species and impacts on surface and groundwater quality.

Cattle have direct access to the bed and banks of waterways on private and public land across the island. This leads to eroded banks, increasing sedimentation into waterways, and deposition of wastes directly into the waterways (ANI, 2004). Unrestricted access to the bed and banks of waterways significantly reduces the quality of drinking water supplies and recreational waters, such as Emily Bay. Cattle are a major source of waste, pathogen and nutrient pollution of Watermill and Town Creeks (Wilson, 2017). Furthermore, overgrazing of cleared land leads to weakened soil structure and has significantly contributed to erosion on the island (Parsons Brinckerhoff, 2009). Erosion increases sediment loads in waterways and also reduces the ability of vegetation to establish on eroded land.

Norfolk Island has rugged terrain in some places. Cattle have access to some steep areas that have been severely damaged by grazing. This can be seen not only in the form of land slips and erosion, but also in the form of 'terraces' which look like small terraces following the contours of the land. Terraces are caused where soil has slipped on cleared slopes and can be seen at Cockpit, Ball Bay and Kingston. Cattle grazing is not the only reason for this type of land degradation, but it is a significant contributing factor. Steep slopes cleared of vegetation are not suitable for cattle grazing, and due to the thinner soils, they tend to offer poor quality grazing compared to flatter areas (GHD, 2016a).

Cattle grazing within areas containing remnant vegetation impact the viability of plant survival and damage new growth. In addition, cattle disperse seeds of exotic weeds (Director of National Parks, 2010). While cattle may actually assist in keeping some weeds under control, they will graze native vegetation in preference to weed species. This means that the only areas that cattle can be used to control weeds without impacting native plants are (i) where all native plants have already been cleared; or (ii) where mature trees are above cattle head height and no native revegetation is sought.

Some weed species are toxic to cattle, such as Cascade onion (*Homeria flaccida*). Where such species are present in public land, Council pays for these weeds to be sprayed, even if there is little ecological reason for such spraying to be undertaken.

Grazing limits are set each year as pasturage rights for a cow plus a calf up to six months. Rights costs approximately \$140 each year. Applicants can have up to eight rights, and the number of rights granted varies annually. At present the public herd is at approximately 200, but has been as high as 285 in 2009 (GHD, 2016a). GHD calculated that the stocking rate should be 211 cows with calves up to six months for the 183.5 ha of public land that was accessible to cattle in 2016. Should areas such as KAVHA exclude cattle grazing in the future, the size of the herd needs to be reduced accordingly. Musters occur in April and September when calves older than six months are either removed or tagged. The number of cattle pasturage rights should be discussed and communicated in December prior to the issuing of cattle tags in March each year.

For the Norfolk Island community to attain Strategic Direction 1 of the CSP: An environmentally sustainable community, cattle grazing needs to be better regulated as follows:

- Cattle access to streams must be reduced (Parsons Brinckerhoff, 2009; KAVHA Management Board, 2008; Wilson 2017).
- Where cattle are excluded from an area, this should be combined with a targeted revegetation and weeding program (GHD 2016)
- Adhere to the stocking rate of 211 cattle on the 183.5 ha of public land that was accessible to cattle in 2016, and reduce the number of cattle should pasture be poor or areas be made cattle exclusion zones (e.g. KAVHA area) (GHD, 2016)
- Steep land vulnerable to erosion and slippage should be protected from grazing (GHD, 2016)
- Areas of very high conservation value, particularly where threatened plants are on the brink of extinction must be maintained as cattle exclusion zones to comply with requirements not to impact on matters of National Environmental Significance under the *Environmental Protection and Biodiversity Conservation Act, 1999* (Cth) (NI).

#### 6.7.1.4 Environmental and planning resources at Council

The community has indicated a strong commitment to becoming an 'Environmentally Sustainable Community', as shown by this being the top of the list of Strategic Directions in the Community Strategic Plan.

As discussed in Section 2: Resourcing and Implementing the Environment Strategy, adequate resourcing is required in order to implement and achieve the actions of the Strategy. Under Objectives 1 and 2 of the CSP there are a number of strategies, which have been developed into actions under the Environment Strategy. It is recommended that additional resourcing in the environmental and planning sections of Council be considered in future workforce planning.

#### 6.7.2 Opportunities for improvement

Currently, there is no central repository of research, information and data for Norfolk Island. There is also no strategic plan that coordinates research that can be used to inform decision-making and monitor progress on achieving conservation and biodiversity management targets.

### 6.7.3 Action Plan for Objectives 1 and 2

Additional actions to achieve Objective 1 – Use and manage our resources wisely and Objective 2 – Preserve a healthy environment are provided in **Table 25**.

**Table 25: Additional Actions to achieve Objective 1 and Objective 2**

Ref	Item	Action	Priority
2.7a	Environmental and planning resources at Council	Provide additional resources to implement environmental planning and management on Norfolk Island, this may include a team of environmental personnel with a leader who reports directly to the General Manager.	Priority 1
2.7b	Regulation of cattle grazing	Regulate cattle grazing on public lands to reduce impacts on surface water quality, soil degradation and native plant species as follows: <ul style="list-style-type: none"> <li>• reduce direct access to creeks and wetlands and provide hard surfaced areas for drinking troughs</li> <li>• adhere to the stocking rate of 211 cattle for 183.5 ha of public land, and amend where less land is available</li> <li>• exclude cattle from very steep land to reduce erosion and slippage</li> <li>• exclude cattle from areas where threatened native plants are on the brink of extinction</li> <li>• exclude cattle from areas of high conservation value, ensuring that exclusion is accompanied by revegetation and weed control</li> <li>• monitoring pasture condition to allow intervention when pasture is in poor condition</li> </ul>	Priority 1
2.7c	Preliminary site investigations	Complete preliminary investigations at potentially contaminated sites. Further investigation and mitigation could be undertaken following assessment.	Priority 2
2.7d	Groundwater sampling program	Develop a groundwater sampling program to detect any impacts from waste management practices.  The sampling programs should test for metals (arsenic, chromium, copper, cadmium, nickel, mercury, lead and zinc), Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethylbenzene and Xylene (BTX), Polyaromatic Hydrocarbons (PAH), Pesticides and nutrients. This list is designed to indicate impacts to groundwater from leachate from former landfill sites or surface contamination.	Priority 2
2.7e	Research station on Norfolk Island	Determine the feasibility of operating a Norfolk Island research station. This would assess the cost to convert one of a number of currently available buildings into a research station and determine how best to administer and advertise its use so that it is effectively used.  The research station might facilitate terrestrial and aquatic research and monitoring, which could be used in State of the Environment Reporting. It could be used to attract research scientists to visit Norfolk Island to fill in some of the gaps in environmental knowledge.  Establish a research group to coordinate the research effort for both terrestrial and aquatic biodiversity research. This could allow for State of the Environment reporting by collection of data on each of the indicators in the SOE framework	Priority 3
2.7f	Contaminated Land Management	Establish a Contaminated Land Management Policy and Remediation Action Plan as required in line with Commonwealth requirements.	Priority 3

## 7 State of the Environment Reporting Framework

### 7.1 Introduction

This section of the Environment Strategy presents an overarching framework for future State of the Environment reporting for Norfolk Island. State of the Environment Reports must be prepared in accordance with the Integrated Planning and Reporting guidelines under section 406 and 428A of the *Local Government Act 1993 (NSW)(NI)* Section 428A (3) states the State of the Environment Report is to:

- establish relevant environmental indicators for each environmental objective
- report on, and update trends in, each such environmental indicator
- identify all major environmental impacts (being events and activities that have a major impact on environmental objectives).

In addition, under Section 428A of the *Local Government Act 1993 (NSW)(NI)*, a State of the Environment Report must be included in the Annual Report in the year in which an ordinary election of councillors is to be held as to the state of the environment in the local government area (Norfolk Island).

The State of the Environment Report must address the environmental objectives established in the Community Strategic Plan (CSP). Strategic Direction 1 (An environmentally sustainable community) of the Norfolk Island CSP set down the following environmental objectives:

- Objective 1 – Use and manage our resources wisely
- Objective 2 – Preserve a healthy environment.

### 7.2 State of the Environment Reporting Structure

#### 7.2.1 Environmental Themes

The state of the environment is reported under environmental themes relevant to the environmental objectives established by the CSP. The state of the environment of Norfolk Island will be reported under the six themes listed in **Table 26**.

**Table 26: Environmental themes for Norfolk Island State of the Environment Reporting**

Environmental Objectives in CSP	Environmental Themes for State of the Environment Reporting
1: Use and manage our resources wisely	1. Energy, transport utilities and resources (Tactics 1.1 and 1.4)
	2. Waste (Tactic 1.3)
	3. Sustainable food supply from the land and sea (Tactics 1.5, 1.6 and 2.6)
	4. Clean water in our tanks and marine areas (Tactics 1.2, 1.6 and 2.5)
2: Preserve a healthy environment	5. Population, planning and retaining open landscapes (Tactics 2.1, 2.2 and 2.3)
	6. Biodiversity (Tactics 2.3, 2.4 and 2.6)

These themes have been selected based on a review of existing information including the Norfolk Island Draft State of the Environment Report (Diatloff, 2008), the Norfolk Island Natural Resource Management Plan (Parsons Brinckerhoff, 2009), the CSP and community consultation undertaken for the Environment Strategy.

### 7.2.2 Indicators

State of the environment reporting is based on data and information gathered and measured against indicators. Indicators are used to:

- determine environmental trends
- identify any events or activities that have a major impact on the environmental objectives in the Community Strategic Plan

The community consultation for the Environment Strategy was particularly useful in defining indicators appropriate to Norfolk Island.

### 7.2.3 Measuring and monitoring the indicators

Monitoring and measurement is one of the key elements of the ISO 9001:2015 Quality Management Standard. These terms are defined as follows:

- monitoring: the status of a system, process, or activity (or indicator)
- measuring: the process to determine a value.

Monitoring and measuring programs have been identified for each environmental indicator to:

- obtain baseline data, either by adapting existing data sets or commencing new data collection
- measure and monitor environmental data on an ongoing basis
- compare measuring and monitoring results against baseline data to determine trends in the environmental data, and whether there have been any major impacts.

### 7.2.4 Data for measuring and monitoring indicators

A framework for state of the environment reporting on Norfolk Island has been developed using the structure described above. Each of the six environmental themes is assigned indicators and current methods available to monitor these indicators are presented in Tables 28 to 33. **Some of these indicators rely on data sharing from sources outside Council, so it is important that permission to use such data is followed up as soon as the Environment Strategy is adopted.** Future methods for monitoring are also discussed within each theme.

## 7.3 Theme 1: Energy, transport utilities and resources

**Table 27: Currently available indicators, measuring and monitoring for Theme 1**

Indicators	Measuring and Monitoring the Indicators
Total energy use (Norfolk Island) annually including: <ul style="list-style-type: none"> <li>Energy use per household annually.</li> <li>Energy use for Council operated facilities (STP, airport, power station, office buildings) annually.</li> </ul>	Existing Council energy consumption data, such as the volume of diesel consumed at the Powerhouse, used to determine energy consumption changes for each indicator.
Number of solar hot water systems installed each year.	Survey of number of existing solar hot water systems across the island. Capture data on new solar hot water systems across the island, e.g. sales from solar hot water system suppliers.
Number of vehicles imported annually.	Data from ship's manifest (lighterage).
Number and type of registered vehicles (electric powered, truck, motorbike, sedan, etc).	Council's vehicles registration data.
Volume of diesel used in electricity generation annually.	Council data on diesel usage.
Total Norfolk Island fossil fuel use.	Volume of fuel and gas delivered by tanker.
Sustainable timber supply – percentage of timber sourced from Norfolk Island for construction.	<ul style="list-style-type: none"> <li>Number of new plantations registered under the <i>Trees Act 1997</i> (NI)</li> <li>Amount of timber sourced for construction that is grown and harvested on Norfolk Island.</li> <li>Amount of timber imported to Norfolk Island.</li> </ul>

### 7.3.1 Planning for future monitoring and measuring of Environmental Theme 1: Energy, utilities and resources

#### 7.3.1.1 *Energy consumption and efficiency*

Energy (and the associated greenhouse gas emissions) is a key environmental theme for the island. Hydro Tasmania was engaged by Council in 2018 to consider potential improvements and optimisation of existing equipment through efficient generation, improved processes (e.g. energy storage) and effective controls (e.g. demand management and hot water heating). Further indicators may be identified by the findings of the Hydro Tasmania project.

## 7.4 Theme 2: Waste

**Table 28: Currently available indicators, measuring and monitoring for Theme 2**

Indicators	Measuring and Monitoring the Indicators
Annual volume of waste disposal.	<ul style="list-style-type: none"> <li>Income from waste management disposal fees for the Waste Management Centre (WMC).</li> <li>Volume of waste processed through the multipurpose baler (once infrastructure has been commissioned)</li> </ul>
Annual volume of waste backloaded on otherwise empty freighters.	<ul style="list-style-type: none"> <li>Annual volume of residual waste exported</li> <li>Annual volume of recyclable aluminium exported</li> <li>Annual volume of recyclable steel exported</li> <li>Annual volume of recyclable plastics exported</li> <li>Annual volume of recyclable shredded rubber exported</li> </ul>



Indicators	Measuring and Monitoring the Indicators
Number of poor waste disposal practices.	<ul style="list-style-type: none"> <li>• Compliance notices for illegal dumping (e.g. asbestos)</li> <li>• Number of complaints about backyard burning of general waste</li> <li>• Number of complaints about backyard burning of green waste</li> </ul>
Amount of waste recycled locally.	<ul style="list-style-type: none"> <li>• Annual volume of waste composted at WMC</li> <li>• Annual volume of glass crushed at WMC</li> </ul>

#### 7.4.1 Planning for future monitoring and measuring of Environmental Theme 2: Waste

As per Action 1.3a of the Environment Strategy, a Waste Management Implementation Action Plan should be developed to:

- track and report progress in implementation of the Waste Management Strategic Plan 2015 at least annually
- conduct a baseline waste audit to characterise and quantify current waste streams /volumes and determine per capita production, recycling, avoidance, etc., disposal rates / methods
- measure and record all waste streams coming through the WMC
- estimate and record types and volumes of other waste streams not coming through the WMC
- record types and volumes of all waste exported
- monitor and record user trips to the WMC (count vehicles using the traffic counter at WMC)
- record waste management fees collected (count and record number and value of tickets collected at the ticket office daily)
- develop a complaints system for reporting of illegal dumping, nuisance complaints of backyard burning and other waste related complaints
- conduct and report waste audits at five-year intervals.

### 7.5 Theme 3: Sustainable food supply from the land and sea

Table 29: Currently available indicators, measuring and monitoring for Theme 3

Indicators	Measuring and Monitoring the Indicators
<ul style="list-style-type: none"> <li>• Number of different types of local food produced.</li> </ul>	<ul style="list-style-type: none"> <li>• Measure the number of different food types produced locally (e.g. fresh fruit and vegetables, cheese, meat, jams).</li> </ul>
<ul style="list-style-type: none"> <li>• Number of new agricultural pest species introduced.</li> </ul>	<ul style="list-style-type: none"> <li>• Data from Department of Agriculture and Water Resources.</li> </ul>
<ul style="list-style-type: none"> <li>• Recreational fishing catch weight.</li> </ul>	<ul style="list-style-type: none"> <li>• Data from fishermen who fill out voluntary cards on their catch according to the MOU with AFMA for 'Fishing inside the Box'.</li> </ul>

### 7.6 Theme 4: Clean water in our tanks and marine areas

Table 30: Currently available indicators, measuring and monitoring for Theme 4

Indicators	Measuring and Monitoring
<ul style="list-style-type: none"> <li>• Number of breaches of <i>Public Health Act 2010</i> (NSW)(NI) for supply of drinking water operators.</li> </ul>	<ul style="list-style-type: none"> <li>• Measuring and monitoring according to <i>Public Health Act 2010</i> (NSW)(NI) and the Quality Assurance Programs for each drinking water supplier.</li> </ul>
<ul style="list-style-type: none"> <li>• Number of times recreational water quality results exceed Australian guidelines annually.</li> </ul>	<ul style="list-style-type: none"> <li>• Water quality monitoring data collected for Emily Bay recreational waters (monitoring to be conducted at least once monthly).</li> </ul>

Indicators	Measuring and Monitoring
<ul style="list-style-type: none"> <li>Number of times groundwater quality results exceed Australian guidelines annually.</li> </ul>	<ul style="list-style-type: none"> <li>Council ad hoc bore monitoring data.</li> </ul>
<ul style="list-style-type: none"> <li>Amount of waterways that cattle have direct access to.</li> </ul>	<ul style="list-style-type: none"> <li>Length of waterways that cattle can't access (e.g. due to fencing or other means).</li> </ul>
<ul style="list-style-type: none"> <li>Recreational water quality criteria exceedances from sewage treatment plant discharge to sea.</li> </ul>	<ul style="list-style-type: none"> <li>Water quality monitoring of treated wastewater (monitoring to be conducted based on licence conditions imposed by Department of Environment and Energy under the <i>Environmental Protection and Biodiversity Conservation Act 1999</i> (Cth)).</li> </ul>
<ul style="list-style-type: none"> <li>Performance of sewerage system.</li> </ul>	<ul style="list-style-type: none"> <li>Number of sewage overflow events.</li> <li>Number of upgrades to the sewer network including pump stations and wastewater treatment plant.</li> </ul>
<ul style="list-style-type: none"> <li>Number of non-compliant septic systems on Norfolk Island.</li> </ul>	<ul style="list-style-type: none"> <li>Data available through septic system compliance audits conducted by Council.</li> </ul>

### 7.6.1 Planning for future monitoring and measuring of Environmental Theme 4: Clean water in our tanks and marine areas

#### 7.6.1.1 Water quality monitoring

It is recommended that the water quality modelling adopt the risk-based modelling and assessment methodology (Risk based framework for considering waterway health in strategic land-use planning (<https://www.epa.nsw.gov.au/your-environment/water/policies-guidelines-and-programs>)) that is then used to set catchment specific targets. These targets can then be used to drive development, education campaigns and in catchment management works. Specific targets for specific streams will allow specific ecosystems to be managed and protected based on their water quality requirements rather than a blanket-wide stock-standard removal of nutrients from the runoff. This method would provide a more targeted solution.

The Water and Wastewater Strategy proposed for development in 2018–2019 should be used to determine the accurate baseline for water quality indicators to be set which will also determine the corresponding measurement and monitoring program.

Monitoring of the performance against recommendations and key performance indicators should be detailed in management plans and monitoring programs, prepared in response to the upcoming Water and Wastewater Strategy. This would include mechanisms and timing of the plans content, audits, and processes for adapting management and monitoring as required based on collected data and information.

Key future indicators of water quality on Norfolk Island, include:

- identification of contaminant 'hot spots' (e.g. faulty infrastructure) and 'hot events' (e.g., high rainfall events)
- improvement, as demonstrated through consistent long-term monitoring, in the island's fresh and marine water quality, relevant to recommended guideline values
- improvement in land-use practices, particularly those that have been implicated in influencing the island's poor water quality, e.g. quantifiable evidence of improvements in riparian habitat.

### 7.6.1.2 Water supply

An integrated catchment water quality and quantity monitoring plan should be prepared and this plan would drive the sites tested, recurrence of testing and accuracy of testing.

To address septic tank performance issues, the design and implementation of new wastewater management systems (or updated systems) should use the following guidelines:

- WaterNSW – Onsite wastewater management system (<https://www.watnsw.com.au/water-quality/catchment/living/wastewater/onsite>) and guidelines ([https://www.watnsw.com.au/\\_\\_data/assets/pdf\\_file/0003/58251/Designing-and-Installing-On-Site-Wastewater-Systems-complete-document.pdf](https://www.watnsw.com.au/__data/assets/pdf_file/0003/58251/Designing-and-Installing-On-Site-Wastewater-Systems-complete-document.pdf))
- NSW Health Guidelines for Sewerage facilities (<http://www.health.nsw.gov.au/environment/domesticwastewater/Pages/default.aspx>)

Future water supply indicators will be informed by the proposed Water and Wastewater Strategy, with the following indicators to be used until more information is available:

- number of instances drinking water guidelines not met
- number of drinking water complaints
- average annual household use (kL/household)
- water used by council for irrigation (including treated and untreated) (ML)
- number of bore licences for groundwater resources (noting there is a moratorium)
- establish baseline demand and future targets. Measure through annual water balance
- the volume of water bought from the water tankers
- the volume of water harvested, the change in groundwater levels and quality
- the amount of STP effluent reused and the percentage of solids reused.

## 7.7 Theme 5: Population, planning and retaining open landscapes

**Table 31: Currently available indicators, measuring and monitoring for Theme 5**

Indicators	Measuring and Monitoring
<ul style="list-style-type: none"> <li>• Number of new dwellings.</li> <li>• Number of new portions created by subdivision.</li> </ul>	<ul style="list-style-type: none"> <li>• Development applications for new dwellings, renovations and subdivision of land.</li> </ul>
<ul style="list-style-type: none"> <li>• Total population per annum</li> <li>• Visitor population per annum</li> </ul>	<ul style="list-style-type: none"> <li>• ABS Census data</li> <li>• Council to liaise with Border Force to obtain population data.</li> <li>• Use data from Tourism Advisory Committee Meeting Minutes</li> </ul>
<ul style="list-style-type: none"> <li>• Number of households with telephone connections.</li> <li>• Increase in number of households with internet connections.</li> </ul>	<ul style="list-style-type: none"> <li>• Data available through Norfolk Telecom and other internet service providers on the island for information about telephone and internet connections.</li> </ul>
<ul style="list-style-type: none"> <li>• Strategic management of Public Reserves.</li> </ul>	<ul style="list-style-type: none"> <li>• Preparation and implementation of Management Plans for Public Reserves.</li> </ul>
<ul style="list-style-type: none"> <li>• Area of land in the conservation and open space zones</li> </ul>	<ul style="list-style-type: none"> <li>• Information in the Norfolk Island Plan and development applications.</li> </ul>
<ul style="list-style-type: none"> <li>• Length of bicycle paths or tracks, off-road paths and mountain-biking tracks.</li> </ul>	<ul style="list-style-type: none"> <li>• Council's data.</li> </ul>
<ul style="list-style-type: none"> <li>• Long-term changes to air temperature and other variables that have links to greenhouse gas emissions and climate change.</li> </ul>	<ul style="list-style-type: none"> <li>• Amount of change to BOM data including air temperature, rainfall, solar radiation, surface sea temperature, and tidal data.</li> </ul>

## **7.7.1 Planning for future monitoring and measuring of Environmental Theme 5: Population, planning and retaining open landscapes**

### *7.7.1.1 Population*

A sustainable population policy will be developed by Council in 2019 under operational plan action 2.2.1 of the Norfolk Island Operational Plan 2018–2019.

### *7.7.1.2 Contamination*

Contamination should be measured and monitored as it impacts on future planning due to potential land-use restrictions and human and ecological health impacts. Indicators of contamination can be measured against the current available New South Wales and Australian guidelines:

- ARMCANZ (2000), National Water Quality Management Strategy, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Protection of Aquatic Ecosystems
- National Environment Protection (Assessment of Site Contamination) Measure (1999), (Amended 2013)
- NSW EPA (2016), Environmental Guidelines, Solid Waste Landfill, Second Edition, Landfill Gas sub-surface monitoring
- *Contaminated Land Management Act 1997* (NSW).
- *Protection of the Environment and Operations Act 1997* (NSW)
- NSW State Environmental Planning Policy No 55—Remediation of Land
- WA Department of Health (2009), Guidelines on the Assessment, Management and Remediation of Asbestos Contaminated Sites in Western Australia, May 2009.

To measure the Island’s performance against the specific indicators, sample analysis and data collection is required. From the current limited knowledge of contamination sources or impacted areas across Norfolk Island, it is envisaged that the following monitoring would be required:

- sampling of upgradient soil, surface water and groundwater to generate a background level reference point
- cyclical monitoring of the former landfills sites for leachate and landfill gas accumulation and impacts
- groundwater monitoring of known impacted locations to assess long-term trends, mapping of exposure pathways and/or success of remediation
- soil sampling to identify contamination sources, map potential plume pathways and/or success of remediation.

### *7.7.1.3 Climate change*

Norfolk Island’s greenhouse gas emissions are uncertain. The Commonwealth Government provides combined emissions figures for all of Australia’s external territories. The figures include emissions from Norfolk, Christmas, Cocos (Keeling), Heard and McDonald Islands. In 2016, the combined emissions from these external territories were 46.40 Gg CO<sub>2</sub> equivalent (or 0.01 per cent of Australia’s total emissions). To put this in perspective, NSW emissions for that year were 130 274 Gg CO<sub>2</sub> equivalent.

No comprehensive climate change assessment has been undertaken on Norfolk Island since Watkins, 1999, under the Commonwealth Government’s Australian Coastal Vulnerability Case Study – Climate Change Program. This study used Norfolk Island as a case study and showed that climate change and the resulting increase in sea levels would see the loss of wetlands in KAVHA (Diatloff, 2008).

More recently, a climate change strategy was prepared for the Norfolk Island National Park and Botanic Gardens. The climate projections used in this assessment were at a relatively fine scale; however, the assessment was specific to protecting the biodiversity of the Norfolk Island National Park and Botanic Gardens against climate change.

The initial task would be to collate the existing climate data for the island under the following broad climate variables:

- temperature (maximum, minimum)
- sea surface temperature
- rainfall (mean, heavy and extreme)
- solar radiation
- wind (mean, strong, extreme)
- sea level rise
- ocean acidity (pH)
- extreme weather and weather systems (e.g., storms, El Niño/La Niña).

Once the existing climate has been characterised, climate change projections for those variables would be quantified to understand the level of risk and impact posed to each risk category on the island. Once these are defined, adaptation, mitigation and management measures could be determined.

## 7.8 Theme 6: Biodiversity

**Table 32: Currently available indicators, measuring and monitoring for Theme 6**

Indicators	Measuring and Monitoring
Population size of threatened plants.	Number of threatened plants counted in regular surveys conducted by Parks Australia within Norfolk Island National Park
Population size of threatened animals.	Number of threatened animals counted in regular surveys conducted by Parks Australia within Norfolk Island National Park
Volume of native plants propagated	Volume of native plant species propagated in the native plant nursery for use in public and private restoration.
Cat population management	<ul style="list-style-type: none"> <li>• Number of feral cats trapped by Parks Australia in Norfolk Island National Park</li> <li>• Number of feral cats trapped by Council within public reserves and private land</li> <li>• Number of cats desexed on Norfolk Island</li> </ul>
Invasive species present	<ul style="list-style-type: none"> <li>• Number of new invasive species detected</li> </ul>
Size of rat population	Rat survey data (collected by Parks Australia within the Park)
Area of land affected by Argentine ants	Total land area previously affected by argentine ants now free of them.
Formosum lily population size	Number of Formosum lily flowers handed in by the Flora and Fauna Society annual bounty.

### 7.8.1 Planning for future monitoring and measuring of Environmental Theme 6: Biodiversity

#### 7.8.1.1 Flora

Baseline data is required to determine the extent of native vegetation present on Norfolk Island, and the vegetation communities present within it. Action 2.6a of the Environment Strategy recommends

a formal GIS mapping project of Norfolk Island to determine the extent of native vegetation present, and the various vegetation communities present, consistent with Australian vegetation mapping guidelines. Once this project is complete, the following indicators can then be established and monitored for change over time:

- total native vegetation cover present
- total area of habitat for threatened plant and animal species
- total area of native vegetation being restored. This might further be subdivided into areas of native forest that are being weeded; and areas of bare ground or weeds that have been completely revegetated.

Should vegetation restoration be undertaken in the National Park, public reserves and elsewhere, monitoring of vegetation condition could then be undertaken. This could be based on the GIS mapping, with subsequent GIS mapping specifically designed to detect changes in vegetation condition. Alternatively, on-ground survey transects could be established at strategic locations for long-term monitoring. This kind of on-ground vegetation monitoring is resource intensive, and it is likely that external funding would be required to sustain such a program

#### 7.8.1.2 *Fauna*

Baseline data is critical to understanding the changes over time and the effectiveness of any measures being undertaken for fauna. At present, Parks Australia collects some data on the population size of threatened animals within the Norfolk Island National Park. Action 2.4a of the Environment Strategy recommends further baseline surveys to assess the status of threatened species. This would allow for further indicators to be established and measured, including:

- changes in population size of native fauna
- distribution of native fauna across the island.

#### 7.8.1.3 *Marine*

The quality of water entering the marine environment is addressed in Tactic 1.2 (Protect and enhance our water quality) of the Environment Strategy. This includes monitoring of water in Emily Bay.

An established marine ecosystem health 'baseline' is recommended to allow for long-term trends to be characterised. This is recommended in actions 2.5a and 2.5b of the Environment Strategy. During consultation on the Environment Strategy, Parks Australia (Marine Protected Areas Branch) offered to work with Council to clarify and identify baseline information and monitoring to allow identification of long-term trends in the Norfolk Marine Park. Once such baseline data is collected, the following indicators could be used:

- identification of marine areas that require immediate action to limit deterioration and species loss (such as coral in Emily Bay)
- areas of high conservation significance
- water column turbidity and transparency
- changes in marine microbial assemblages (these are the first to respond to changes in the chemical and physical properties of the surrounding water)
- number of disease and outbreaks
- number of invasive species
- native species occurrence
- abundance and distribution of coral, seagrasses, invertebrates, fish.

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## 9 Appendix A – Summary of all actions listed in order of priority

### 9.1 Priority 1 Actions

As per **Table 1**, which is a key to the priority of actions, Priority 1 actions are of a very high priority and should be commenced within one year of Council adoption of this Environment Strategy. Priority 1 actions are essential to achieving Strategy Objectives. These actions may be achievable within a short time frame with minor costs required. There are 30 actions assigned a Priority 1, and these are summarised in **Table 33**.

**Table 33: Summary of all Priority 1 Actions**

Ref	Item	Action	Priority
1.1a	Education	Provide public education on electricity and incentives for energy efficiency. For example, the use of electrical appliances such as washing machines will use solar electricity on a sunny day, but will call on diesel power during the night.	Priority 1
1.2a	Water quality Baseline data	Collate all the existing data and reports to create an overall database and water quality picture of the island.	Priority 1
1.2b	Expand the Water Assurance Scheme Network	Investigate the option of expanding the WAS network to be extended to capture higher density development areas such as high-density housing in the upper KAVHA catchment.	Priority 1
1.2c	Existing individual on-site sewage treatment systems, septic tanks and holding tanks	Develop and implement an inspection, maintenance and improvement strategy for existing individual on-site sewage treatment to improve treatment outcomes and phase out existing septic tanks and soakage trenches	Priority 1
1.2d	Design and maintenance of on-site systems	Develop and implement Guidelines to be included in Development Control Plan No 2. - Water Resources (2011) to design and maintain on-site sewage systems as per best practice Australian guidelines. Phase out the use of septic tanks and soakage trenches for new development applications.	Priority 1
1.3a	Waste Management Implementation Action Plan	Develop a Waste Management Implementation Action Plan so that actions adopted in the Waste Management Strategic Plan (2015) are recorded and tracked including: <ul style="list-style-type: none"> <li>Item / issue description</li> <li>Priority rating from Medium to Immediate</li> <li>Close out methodology / procedure</li> <li>Close out date</li> <li>Person responsible</li> <li>Status update of the plant, machinery and equipment that has been procured and/or in the process of procurement</li> <li>Updated waste stream data estimates.</li> </ul>	Priority 1
1.3b	Further waste management opportunities and policies	Establish further waste management opportunities and policies to reduce and better manage waste within the bounds of current legislation. For example: <ul style="list-style-type: none"> <li>One car on, one car off the island</li> <li>Continue with the already successful policy and outstanding community efforts (e.g. Boomerang Bags) to reduce plastic bags</li> <li>Encourage people to use reusable drink bottles instead of disposable plastic bottles</li> </ul>	Priority 1

Ref	Item	Action	Priority
		<ul style="list-style-type: none"> <li>Reduce packaging on imported goods, e.g. work with manufacturers and freight agents to reduce plastic and polystyrene packaging</li> <li>Encourage purchasing opportunities that support reduced waste imports to the island</li> <li>Commercial private waste collection services for interested parties, e.g. hotels, businesses, individual households</li> <li>Build on the existing waste education/awareness campaign including information events, school programs, competitions and awards.</li> </ul>	
1.4a	Supply of rock, timber, sand and other natural resources	Employ or contract out resource planning with the aim of planning for long term, sustainable supply of rock, timber, sand, water and other essential materials in accordance with environmental best practice.	Priority 1
1.4b	Timber supply	Develop a source of Norfolk Island Pine ( <i>Araucaria heterophylla</i> ) seedlings to allow for the establishment of registered plantations under the <i>Trees Act 1997</i> (NI). Subject to proper regulations, this will allow for timber to be grown, milled and used in an environmentally sustainable manner into the future.	Priority 1
1.5a	Pest species management	Prepare a Memorandum of Understanding to draw together the legislative and policy guidelines and to clarify the roles of Council and the Department of Agriculture and Water in biosecurity.	Priority 1
1.5b	Sustainable food production	Consult with primary producers as to how to assist with sustainable food production. Knowledge sharing, facilitating assistance from the NSW Department of Primary Industries, and providing incentives for sustainable farming might be some ways to assist primary producers, but communication is the first step.	Priority 1
1.5c	Pest species management	Provide a recommendation to the Commonwealth for <i>Biosecurity Act 2015</i> (NSW) to apply on Norfolk Island. If the Act is applied, declare Norfolk Island a biosecurity zone. This will allow for biosecurity protocols specific to Norfolk Island to be applied to further protect the island's agricultural sector.	Priority 1
1.6a	Data collection	Collect data on water consumption (including bore water usage) to clearly identify existing water demand on the island. This should include water balance accounting to inform planning for a water secure future.	Priority 1
1.6b	Water secure education	Provide education to the community on water harvesting techniques and encourage the community to increase rainwater storage infrastructure and reduce reliance on groundwater supplies.	Priority 1
2.1a	Review of Norfolk Island Plan	During the review of the Norfolk Island Plan 2002, ensure that the Community Strategic Plan Tactic 2.1 Retain Open Spaces and low-density development informs the review. In particular, the preservation of minimum lot sizes in the rural and rural residential zones will help retain low density development.	Priority 1
2.2a	Sustainable resident and tourism population	Conduct a scientifically based assessment of the environmental carrying capacity of Norfolk Island, including residents and visitors. This assessment could be used to inform the sustainable population policy being developed by Council in 2019 (action 2.2.1 of the Norfolk Island Operational Plan 2018–2019).	Priority 1

Ref	Item	Action	Priority
2.3a	Identification and management of Sensitive and High Conservation Value Areas	Using the formal GIS vegetation mapping recommended in Action 2.6a, undertake a review of the mapped natural assets to identify environmentally valuable areas such as habitat for threatened species.	Priority 1
2.3b	Education	Develop and implement a high profile, informed, adapted (to local circumstances) information / education program to increase understanding of the reasons and benefits to both the environment and human activities on the island, of managing land for biodiversity.	Priority 1
2.3c	Pest and weed management	Continue with the development of a pest and weed control plan for Norfolk Island.	Priority 1
2.3d	Private landholder assistance	Provide support and incentives for private land managers who are protecting and preserving valuable environmental areas. Support could include expert advice, assistance with grant applications and hire or loan of cat traps and similar equipment.	Priority 1
2.4a	Baseline survey	Collaborate with Parks Australia, students and scientists to undertake baseline surveys to determine the population status of threatened species	Priority 1
2.4b	Habitat restoration	Restore and maintain vegetation communities that represent habitat for threatened species and protect these from cattle grazing.	Priority 1
2.5a	Determine status of algal and coral reefs, ecosystem processes and interactions.	<p>A management framework should be established to identify and prioritise research areas required to fill gaps in knowledge on the marine ecosystem of Norfolk Island.</p> <p>While the algae-coral dominate reefs of Norfolk Island have been studied, they remain to be comprehensively categorised. Surveys should be undertaken to quantify, for example:</p> <ul style="list-style-type: none"> <li>• species diversity and richness, and patterns of temporal and spatial distribution</li> <li>• ecosystem processes (e.g., nutrient cycling)</li> <li>• oceanographic processes</li> <li>• concentration of contaminants and pollutants.</li> </ul>	Priority 1
2.5b	Develop an integrated management approach.	<p>Integrate the management of Norfolk Island's marine ecosystems with other relevant management plans for example:</p> <ul style="list-style-type: none"> <li>• water quality management and monitoring</li> <li>• land-use management</li> <li>• sustainable development</li> <li>• invasive species.</li> </ul>	Priority 1
2.6a	Vegetation Mapping	Undertake formal GIS vegetation mapping for Norfolk Island, to quantify the extent of native vegetation, and the various vegetation communities present. This mapping needs to be undertaken to be consistent with Federal Government mapping to assist with grant applications for environmental funding.	Priority 1
2.6b	Native Plant Nursery	Provide support for the reestablishment of the Native Plant Nursery. Parks Australia is leading this project and is willing to work collaboratively with Council, for example to allow Council access to plant stock for replanting in public reserves.	Priority 1
2.6c	Staff resources	Attract and recruit a sufficient quantity of qualified casual, part time or full-time staff to undertake pest and weed control in the	Priority 1

Ref	Item	Action	Priority
		public reserves and other public land as per the targets set down for restoration and replanting of important vegetation communities.	
2.6d	Bushland restoration	Undertake strategic bushland restoration in the public reserves, setting targets to increase the area of native vegetation established by the vegetation mapping project, and/or to reduce the number of weeds present in these areas.	Priority 1
2.7a	Environmental and planning resources at Council	Provide additional resources to implement environmental planning and management on Norfolk Island, this may include a team of environmental personnel with a leader who reports directly to the general manager.	Priority 1
2.7b	Regulation of cattle grazing	Regulate cattle grazing on public lands to reduce impacts on surface water quality, soil degradation and native plant species as follows: <ul style="list-style-type: none"> <li>• reduce direct access to creeks and wetlands and provide hard surfaced areas for drinking troughs</li> <li>• adhere to the stocking rate of 211 cattle for 183.5 ha of public land, and amend where less land is available</li> <li>• exclude cattle from very steep land to reduce erosion and slippage</li> <li>• exclude cattle from areas where threatened native plants are on the brink of extinction</li> <li>• exclude cattle from areas of high conservation value, ensuring that exclusion is accompanied by revegetation and weed control</li> <li>• monitor pasture condition to allow intervention when pasture is in poor condition.</li> </ul>	Priority 1

## 9.2 Priority 2 Actions

As per **Table 1**, which is a key to the priority of actions, Priority 2 actions are of a high priority and should be commenced within two to three years of Council adoption of this Environment Strategy. Priority 2 actions are necessary to achieving the Strategy Objectives. There are 21 actions assigned a Priority 2 and these are summarised in **Table 34**.

**Table 34: Summary of all Priority 2 Actions**

Ref	Item	Action	Priority
1.2e	Water Quality Management Plan	Develop an integrated water quality management plan for Norfolk Island. This should include freshwater (surface water, rainwater and groundwater) and marine water ecosystems.	Priority 2
1.2f	Natural barriers to freshwater runoff	Investigate constructing, enhancing or restoring wetlands to improve water quality entering the marine environment, particularly Emily Bay. As this has the ability to impact on KAVHA buildings, this must be undertaken with the appropriate heritage expertise via the KAVHA Commonwealth Heritage Manager.	Priority 2
1.2g	Replacing ageing STP infrastructure	Investigate replacing ageing infrastructure at the STP to improve treatment outcomes.	Priority 2
1.3c	Improve waste management facilities and	Expand the WMC to allow for additional bays for larger units of specific waste streams such as oil drums, white goods and batteries. The warehouse should be lockable with access	Priority 2



Ref	Item	Action	Priority
	processes to reduce impact on the environment	controlled by WMC staff. Bays are to be undercover protected from inclement weather, made of hardstand flooring, bunded with sumps to collect spills / leaks, labelled. The potential also exists to have solar panels installed on the larger surface area roof to assist with power generation and reduce power costs.	
1.3d	Develop facilities to encourage reuse of waste	Develop a dedicated resource recovery facility, containing recycling bays for timber, white goods, household goods, furniture and clothing for residents to select materials they wish to reuse.	Priority 2
1.3e	Advanced waste treatment technologies	Investigate the feasibility of advanced waste treatment technologies such as waste to energy.	Priority 2
1.5c	Food production	Implement recommendations from the University of Newcastle's Green Economy Blueprint (when available) to increase the production of supply of food for local consumption, for visitors to take home and for export.	Priority 2
1.5e	Diversify food products	Provide information and advice on the importance of the importation of ruminants and rootstock to the Norfolk Island economy and to creating a food secure future. Support the proposed review into ruminants by the Australian Government.	Priority 2
1.5f	Review of Norfolk Island Plan	During the review of the Norfolk Island Plan 2002, ensure that the protection of agricultural land from fragmentation and inappropriate development is considered.	Priority 2
1.6c	Sustainability of freshwater resources	To inform water security planning, investigate the following: <ul style="list-style-type: none"> <li>the nature of freshwater resources, including recommended sustainable volumes for extraction</li> <li>new mechanisms for water conservation</li> <li>the feasibility of additional water infrastructure such as water storage reservoirs.</li> </ul>	Priority 2
2.1b	Development contribution scheme	Consider utilising the mechanism already present in the <i>Planning Act 2002</i> (NI) for the establishment of an equitable Development Contribution Scheme. This would allow for developers to contribute fairly toward open space establishment and upkeep, especially as the resident and visitor population increases.	Priority 2
2.3e	Restoration of high value areas	Using the maps identifying high value conservation areas, undertake ecological restoration including weeding, replanting and cattle exclusion.	Priority 2
2.3f	Cat management	Phase in registration, microchipping and subsidised desexing of pet cats, as per the strong community demand for this shown in the 2017 'Cat Survey'.	Priority 2
2.4c	Monitoring	Collaborate with Parks Australia and community organisations to monitor the success of biodiversity management. Monitoring includes threatened species management, restoration of environmentally sensitive areas, habitat restoration and revegetation work.	Priority 2
2.4d	Biodiversity Management Plan	Develop a Norfolk Island Biodiversity Management Plan that sets clear targets to manage the terrestrial biodiversity of the Norfolk Island group.	Priority 2
2.4e	Threatened species	Consider a re-introduction program for native species lost from parts of the Norfolk Island group or from Lord Howe Island	Priority 2

Ref	Item	Action	Priority
2.5c	Enhance community and stakeholder appreciation of the marine ecosystem.	Implement an education campaign to increase awareness of the marine ecosystem of Norfolk Island, and how they can assist in minimising these, or be involved in monitoring (community science).	Priority 2
2.6e	Revegetation and Community Landcare	Determine whether Norfolk Island can become a Natural Resource Management (NRM) region so as to access assistance as part of Australia's Landcare community.	Priority 2
2.6f	External funding	Using the vegetation mapping (prepared consistent with Australian Federal mapping), seek assistance for restoration of mapped vegetation communities.	Priority 2
2.7c	Preliminary site investigations	Complete preliminary investigations at potentially contaminated sites. Further investigation and mitigation could be undertaken following assessment.	Priority 2
2.7d	Groundwater sampling program	Develop a groundwater sampling program to detect any impacts from waste management practices.  The sampling programs should test for metals (arsenic, chromium, copper, cadmium, nickel, mercury, lead and zinc), Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethylbenzene and Xylene (BTX), Polyaromatic Hydrocarbons (PAH), Pesticides and nutrients. This list is designed to indicate impacts to groundwater from leachate from former landfill sites or surface contamination.	Priority 2

### 9.3 Priority 3 Actions

As per **Table 1**, which is a key to the priority of actions, Priority 3 actions are required and should be commenced within three to five years of Council adoption of this Environment Strategy. Priority 3 actions will contribute to ongoing progress toward achieving the Strategy Objectives. There are 11 actions assigned a Priority 3 and these are summarised in **Table 35**.

**Table 35: Summary of all Priority 3 Actions**

Ref	Item	Action	Priority
1.2h	A feasibility study on the installation self-treating septic systems	Investigate the feasibility of decentralised waste-water treatment systems that connect and service multiple upgradient dwellings.	Priority 3
1.4c	Electric vehicles	Assess the potential for electric vehicles to form part of the solution to the problem of excess solar electricity having to be dispersed via the heater bank at the Powerhouse.	Priority 3
1.4d	Encourage active transport	Develop an Active Transport Plan to provide for footpaths, bicycle paths and mountain bike tracks to encourage green transport.	Priority 3
1.4e	Assess the airport's refuelling system	Undertake an assessment of the underground fuel hydrant system at the airport. The assessment should assess whether the hydrant system has been suitably decommissioned and whether there is land contamination present.	Priority 3

Ref	Item	Action	Priority
1.7a	Coastal zone management.	<p>Prepare a Coastal Zone Management Plan that adopts a coordinated approach to the maintenance of a sustainable coastal zone and marine ecosystem encompassing appropriate management of all impact pathways such as:</p> <ul style="list-style-type: none"> <li>• development</li> <li>• sewage and wastewater treatment and disposal</li> <li>• invasive species</li> <li>• freshwater runoff</li> <li>• land-use practices</li> <li>• erosion and sediment control.</li> </ul>	Priority 3
1.7b	Impacts of projected climate change remain to be quantified.	<p>Commission an assessment of climate change projections for the Norfolk Island region, to determine what impacts (positive or negative) this may pose to the island's marine environment. Implement recommendations made in the assessment.</p>	Priority 3
2.1c	Voluntary Conservation covenants	<p>Consider a mechanism for voluntary conservation covenants to be placed over land by private and public landholders. This may allow landholders to access concessions as per mainland NSW conservation covenantees, while increasing the amount of open space preserved in perpetuity. It might also offer a mechanism to offer further protection to those Public Reserves which are now no longer listed on Commonwealth Heritage list</p>	Priority 3
2.5d	<p>Presence of invasive species not known.</p> <p>If present, impacts of invasive species not known.</p>	<p>Undertake invasive marine surveys in accordance with the National System for the Prevention and Management of Marine Pest Incursions, and Australian Marine Pest Monitoring Manual.</p> <p>Research programs need to be established to provide a better understanding of interactions and seasonal changes within the bays, before limitations can be placed on any activity.</p>	Priority 3
2.6g	Noxious weeds	<p>Amend the <i>Noxious Weeds Act 1916</i> (NI) to update the list of scheduled weeds, which is currently out of date.</p>	Priority 3
2.7e	Research station on Norfolk Island	<p>Determine the feasibility of operating a Norfolk Island research station. This would assess the cost to convert one of a number of currently available buildings into a research station and determine how best to administer and advertise its use so that it is effectively used.</p> <p>The research station might facilitate terrestrial and aquatic research and monitoring, which could be used in State of the Environment Reporting. It could be used to attract research scientists to visit Norfolk Island to fill in some of the gaps in environmental knowledge.</p> <p>Establish a research group to coordinate the research effort for both terrestrial and aquatic biodiversity research. This could allow for State of the Environment reporting by collection of data on each of the indicators in the SOE framework</p>	Priority 3
2.7f	Contaminated Land Management	<p>Establish a Contaminated Land Management Policy and Remediation Action Plan as required in line with Commonwealth requirements.</p>	Priority 3