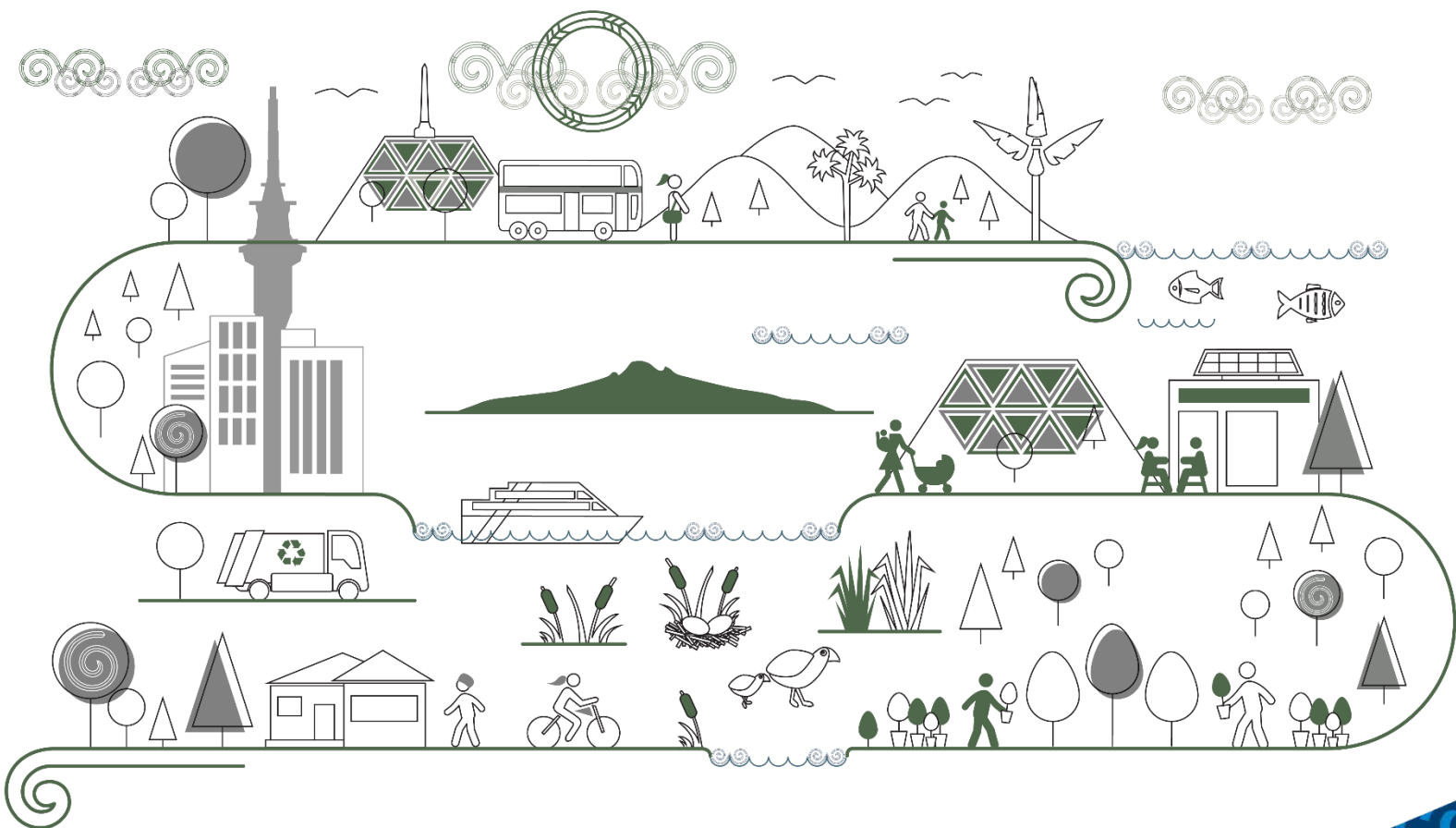


Auckland Plan 2050 Evidence Report

Environment and Cultural
Heritage June 2018



© 2018 Auckland Council

June 2018

Auckland Plan, Strategy and Research Department

Auckland Council (2018). Auckland Plan 2050 Evidence Report: Environment and Cultural Heritage

ISBN 978-1-98-856438-8 (PDF)

The Auckland Plan 2050 was adopted by the Auckland Council Planning Committee on 5 June 2018.

This document supports the Environment and Cultural Heritage outcome in the Auckland Plan 2050 as at June 2018. Please note that the Auckland Plan 2050 is a digital plan and may be updated from time to time. Please refer to the Auckland Plan website, www.theaucklandplan.govt.nz for the most up to date version of the full plan.

This publication is provided strictly subject to Auckland Council's copyright and other intellectual property rights (if any) in the publication. Users of the publication may only access, reproduce and use the publication, in a secure digital medium or hard copy, for responsible genuine non-commercial purposes relating to personal, public service or educational purposes, provided that the publication is only ever accurately reproduced and proper attribution of its source, publication date and authorship is attached to any use or reproduction. This publication must not be used in any way for any commercial purpose without the prior written consent of Auckland Council.

Auckland Council does not give any warranty whatsoever, including without limitation, as to the availability, accuracy, completeness, currency or reliability of the information or data (including third party data) made available via the publication and expressly disclaim (to the maximum extent permitted in law) all liability for any damage or loss resulting from your use of, or reliance on the publication or the information and data provided via the publication. The publication, information, and data contained within it are provided on an "as is" basis.

Table of Contents

1	Introduction - Purpose	4
2	Context.....	11
3	Evidence	22
4	Stakeholder Feedback	54
5	Public Consultation.....	57
6	Conclusion	65
	References	70
	Appendix 1: Further detail on the Resource Management Act framework	78

1 Introduction

1.1 Purpose

The purpose of this paper is to inform, support and provide background material for the Environment and Cultural Heritage Outcome in the Auckland Plan 2050.

It focuses on specialist knowledge and evidence related to the themes in the Environment and Cultural Heritage outcome. Information has been drawn from a wide range of sources including feedback from consultation with Aucklanders during two rounds of engagement in 2017 and public consultation in 2018. Key partners and stakeholders who have provided feedback include central government, mana whenua, mataawaka, community and environmental organisations, the private sector, professional bodies and industry associations.

Overall, this paper provides background evidence for the strategic framework of the Environment and Cultural Heritage outcome.

This report is one of a set of interrelated background papers prepared to support the Auckland Plan 2050. The Auckland Plan 2050 sets the strategic direction for the region and, collectively, these evidence reports provide the foundational background information that also may assist in the future development of policy positions.

This theme considers the management of Auckland's natural environment and cultural heritage within the context of the three key challenges that have framed the development of the Auckland Plan 2050:

- population growth and its implications
- sharing prosperity with all Aucklanders
- reducing environmental degradation.

1.2 Outcome Description

Auckland's natural environment is the basis for our existence. It supports and enables all aspects of our society, economy and culture (see for example WWF, 2016; EDS, 2016). It affects our health and wellbeing through the mental and physical interactions we have with it, and provides the clean air we breathe and fresh water we drink. The environment is also inextricably connected to our sense of identity and place and is a fundamental part of our shared cultural heritage, providing an anchor for the sense of belonging communities have to their place.

The quality of our natural environment means that Auckland has always been a desirable place to be. It allowed people to survive and thrive, and it gave rise to other aspects of cultural heritage such as stories, art and knowledge. Our natural environment enticed people to invest in Auckland over hundreds of years. It continues to draw migrants and is

one reason why so many people call Auckland home (Crothers, no date; Auckland Council, 2012a).

Auckland's environment not only supports its people, it is home to many special local ecosystems and is essential for the survival of both indigenous wildlife and species from across the world (Auckland Council, 2015; EDS, 2016; Forest and Bird, 2017). We have a responsibility to ensure the natural environment is protected and cared for, both for its intrinsic value and to sustain life for future generations.

1.2.1 Protection

Preserving and managing Auckland's diverse environments and protecting their quality is a complex and vital responsibility shared by all Aucklanders.

It is particularly complex in the context of a growing population and the requirements of the commercial, agricultural and industrial activities that form part of our economy.

Despite past efforts to protect and enhance the natural environment, it has been significantly stressed by the impacts of human activity (see for example Auckland Council, 2015; EDS, 2016). It continues to be negatively impacted by the consequences of past decisions, the inability of infrastructure to cope with current pressures and the day-to-day lifestyle decisions people make.

We continue to see negative environmental consequences from historic land use and infrastructure decisions.

1.2.2 Doing Better in the Future

As Auckland grows we must do things differently. We have to achieve better environmental results through our decision-making.

There are also new problems to address.

Heat waves, droughts and tropical storms are part of our lives. However, the consequences of the changes in climate we are now beginning to experience are very likely to worsen (NIWA, 2017) and to have major long term effects on how we live.

We must take action to reduce and mitigate these threats and minimise the impacts on Auckland's cultural heritage, human population and ecosystems.

Protecting, restoring and enhancing our natural environment and cultural heritage are critical to ensuring our future.

1.2.3 Cultural Heritage Definition

Cultural heritage is the term used to describe the ways of living developed by a community and passed on from generation to generation, including customs, practices, places, objects, artistic expressions and values (Vecco, 2010; Auckland Regional Council, 2009a).

It is the legacy of knowledge, things and intangible attributes of a group or society that are inherited from past generations, maintained in the present and passed on to future generations.

Cultural heritage includes:

- tangible culture such as buildings, monuments, landscapes, books, works of art and artefacts
- intangible culture such as folklore, traditions, language and knowledge
- natural heritage including culturally significant landscapes and biodiversity.

Auckland's cultural heritage is rich and diverse. It includes Māori and non-Māori heritage (Auckland Council, 2012b).

It includes the Tāmaki Paenga Hira/Auckland War Memorial Museum and Pukekawa/Auckland Domain.

It encompasses the extensive archaeological landscapes of Āwhitu Peninsula, the Auckland Isthmus maunga, the Tupuna Maunga, the Ōtuataua stone fields and the Franklin volcanic fields.

It includes post-war architecture such as the Group Architect houses, engineering feats such as the Grafton Bridge and our Victorian and Edwardian buildings.

Our cultural heritage places comprise sites, features, areas, townscapes, streetscapes, landscapes, settlements and other historical places.

Figure 1 Cultural Heritage Component



1.3 Relationship to other Auckland Plan Outcomes and Development Strategy

The Environment and Cultural Heritage theme has strong interrelationships with the other outcomes of the Auckland Plan. These are highlighted in Figure 2 and summarised in Table 1 below:

Figure 2 Linkage between Auckland Plan outcomes

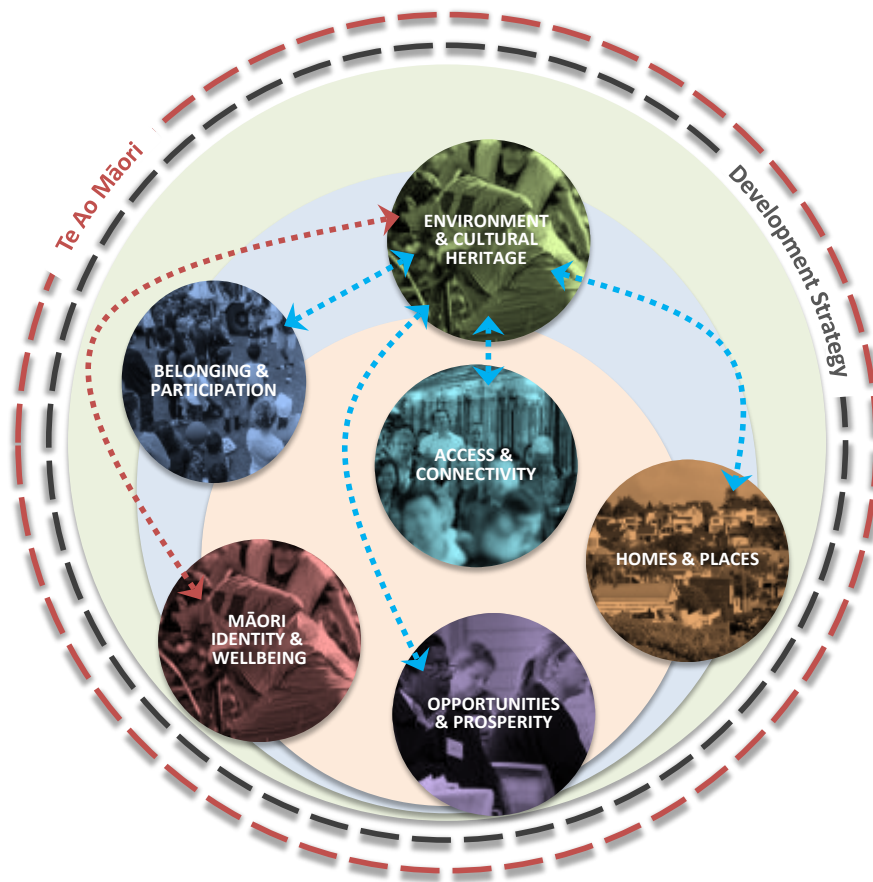


Table 1 Key relationships against other outcomes

Outcomes	Key relationships
Development Strategy	<ul style="list-style-type: none"> • Auckland’s growth has the potential to significantly impact on its natural environment and cultural heritage. Much of the decline in Auckland’s natural environment and cultural heritage trends have stemmed from the decisions and actions that Aucklanders have made, both day-to-day decisions as well as larger decisions about how Auckland has grown and developed. • Finding better ways to service growth – through future-proofed, low impact and more resilient infrastructure – and identifying opportunities to protect and enhance important natural environment and cultural heritage features is important to delivering better outcomes for Auckland.

Outcomes	Key relationships
Belonging and Participation	<ul style="list-style-type: none"> • The natural environment is inextricably connected to Aucklanders' sense of identity and place. It affects our health and wellbeing through the mental and physical interactions we have with it, and it provides the clean air we breathe and fresh water we drink. • It is also a foundational part of Auckland's shared cultural heritage, providing an anchor for the tangible and intangible heritage that links communities to their places and giving rise to rich cultural heritage aspects such as our stories, art and knowledge.
Māori Identity and Wellbeing	<ul style="list-style-type: none"> • Māori have a deep-rooted relationship with Auckland's natural environment and have been a key influencer on our shared cultural heritage. • Mana whenua in particular have a unique relationship with the natural environment as kaitiaki. They hold an enduring relationship with the land, marine and freshwater environments and have deep and valuable knowledge. Their body of knowledge, both tangible and intangible, cultural practices and heritage are all linked to the whenua and its life. • Te ao Māori concepts such as kaitiakitanga, rangatiratanga, whanaungatanga and manaakitanga offer Auckland an integrated approach to protecting and enhancing our treasured environments for ourselves and for future generations. • Embedding these concepts and the broader knowledge of mana whenua into our thinking and decision-making supports a focus on the interrelationships between the natural environment and people that is essential to successful and sustainable environmental management.
Homes and Places	<ul style="list-style-type: none"> • Our natural environment and cultural heritage helps create quality spaces and places where people want to live, work and play, however urbanisation and modern living puts pressure on what we want to protect and enhance, e.g. modification of landscapes and greater resource consumption. • Ensuring our developments are more sustainable, lower impact and deliver broader environmental, social and economic outcomes is becoming increasingly important.

Outcomes	Key relationships
Transport and Access	<ul style="list-style-type: none"> • Many of the benefits associated with our natural environment and cultural heritage – e.g. building a sense of belonging, supporting quality homes and places – requires equitable access to our natural environment and cultural heritage resources. • Current mechanisms of enabling this access can however lead to negative impacts on our natural environment and cultural heritage, such as air and water quality impacts as well as the potential degradation of heritage places. • Considering broader environmental and sustainability outcomes in the design and operation of our transport system can also deliver broader benefits, such as the encouragement of more active, healthier transport modes and the integration of land-use, transport and societal outcomes.
Opportunity and Prosperity	<ul style="list-style-type: none"> • Auckland's natural environment and cultural heritage are key points of difference that help to attract and retain skills, talent and investment, despite the challenges we see from congestion and affordability. • Auckland's natural environment provides opportunities for economic diversification – in areas like tourism, food production, innovation in low carbon technologies and green infrastructure – and is part of the Auckland/New Zealand story of “how the world sees us”.

2 Context

This section presents the context that has framed the Environment and Cultural Heritage outcome. It comprises:

- a review of the relevant content from the 2012 Auckland Plan (Section 2.1);
- a summary of relevant national and council policies, strategies, plans, and legislative requirements (Section 2.2);
- an overview of key trends relevant to the outcome (Section 2.3); and
- a summary of the main challenges and opportunities facing Auckland's natural environment and cultural heritage over the next 30 years (Section 2.4).

2.1 2012 Auckland Plan Direction

The 2012 Auckland Plan discusses the protection and enhancement of Auckland's natural environment and cultural heritage in a number of places. The directions of particular relevance are:

- Strategic Direction 2 (Enable Māori aspirations through recognition of the Treaty of Waitangi and Customary rights);
- Strategic Direction 4 (Protect and conserve Auckland's historic heritage for the benefit and enjoyment of present and future generations);
- Strategic Direction 7 (Acknowledge that nature and people are inseparable);
- Strategic Direction 8 (Contribute to tackling climate change and increasing energy resilience);
- Strategic Direction 9 (Keep rural Auckland productive, protected and environmentally sound); and
- Strategic Direction 12 (Plan, Deliver and Maintain quality infrastructure to make Auckland liveable and resilient).

In developing the Environment and Cultural Heritage outcome, it has been acknowledged that the strategic intent of these directions remain valid, focussing on themes such as:

- the important role played by our natural environment and cultural heritage assets in delivering social, economic and environment outcomes;
- the need to focus effort and resources on protecting and enhancing Auckland's natural environment and cultural heritage;
- the increasing pressures being placed on Auckland's natural environment and cultural heritage due to the growth of the city and its population; and
- the need for Auckland's people and communities to be actively involved in the stewardship of our natural environmental and cultural heritage.

However, as with other parts of the 2012 Auckland Plan, the presence of multiple overlapping directions has meant a disjointed response that has failed to deliver improvements in our natural environment and cultural heritage (see Auckland Council, 2015). For example, whilst Strategic Direction 7 focuses on the link between nature and people, the separation of environment from heritage protection (Strategic Direction 4) has the potential to place these aspects in competition for action and resource.

Furthermore, much of the 2012 Auckland Plan content was used to inform the Proposed Unitary Plan and is expressed in the operative parts of the Unitary Plan. Schedules of significant natural and cultural heritage have, for example, been produced whilst the operative parts of the Unitary Plan also provide the regulatory levers to shape the growth and development of Auckland. As they are now embedded in regulation, a repeat in the Auckland Plan 2050 is not warranted.

2.2 Relevant National and Council Policies, Strategies and Plans, Legislative Requirements

This section provides a high level summary of the most relevant national and council policies, strategies, plans, and legislative requirements that have informed the Environment and Cultural Heritage directions and focus areas. Further detail on these frameworks is provided in Appendix 1.

2.2.1 The Resource Management Framework

The Resource Management Act 1991 (RMA) aims to allow sustainable development and utilisation of natural resources, when the environmental effects of using these is appropriately managed, through avoidance and mitigation.

The RMA requires a 'protect and enhance' approach and imposes a hierarchy of planning instruments (shown in Figure 3) to promote sustainable use of resources through protecting significant or important environments, and enhancing those which are degraded. This approach is often seen in Regional Policy Statements which interpret this as protect where environmental quality is good and improve where it is degraded.

Under the RMA, Auckland Council has specific responsibilities, including:

- Discharges of contaminants to land, air and water
- Water quantity and quality
- The coastal marine area
- Soil conservation
- Land use to avoid natural hazards
- Ensuring sustainable management of historic heritage throughout the region
- Providing appropriate development capacity for long term needs of the region
- Preparing regional policy statements

The RMA aims to integrate resource management into a single piece of legislation, and sets up a cascading framework of plans and standards (Figure 3). These are further described in Table 2 and Appendix 1.

Figure 3 RMA Responsibilities (Source: Ministry for the Environment, <http://www.mfe.govt.nz/publications/rma/proposed-national-environmental-standards-electricity-transmission-discussion-5>)

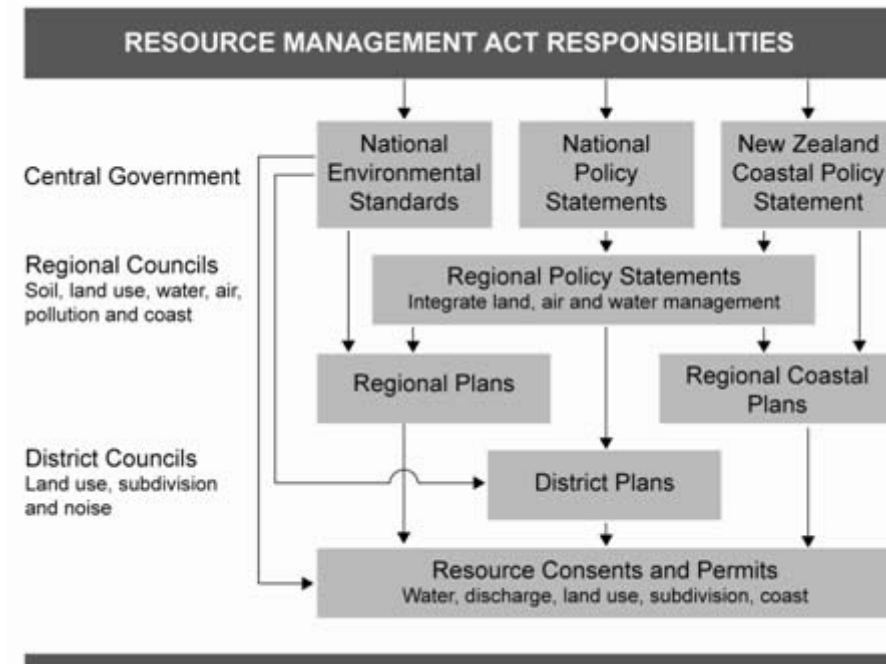


Table 2 RMA Framework Responsibilities of Auckland Council

Resource Management Framework	
Resource Management Act 1991	<ul style="list-style-type: none"> The Resource Management Act 1991 (RMA) aims to allow sustainable development and utilisation of natural resources, when the environmental effects of using these is appropriately managed, through avoidance and mitigation.
National Environmental Standards (NES)	<ul style="list-style-type: none"> To ensure consistency of approach nationally, central government can collaborate with local government to set standards nationally. A NES can be technical in nature prescribing methods or requirements for monitoring. They can prescribe standards that must be adopted by all councils. In some circumstances, where specified in the NES, councils can impose stricter or more lenient standards in line with specific regional requirements.

Resource Management Framework	
National Policy Statements (NPS)	<ul style="list-style-type: none"> • NPS allow central government to prescribe objectives and policies on resource management matters of national significance. These statements can be broad in scope and guide subsequent decision-making under the RMA at the national, regional and district levels. • Regional policy statements and plans and district plans must give effect to all NPSs. The NPS for Freshwater Management, which was amended in 2017, is of particular significance for Auckland at present and is described further below. A NPS for Indigenous Biodiversity is also currently being scoped.
New Zealand Coastal Policy Statement 2010	<ul style="list-style-type: none"> • The New Zealand Coastal Policy Statement 2010 (NZCPS) states the objectives and policies for achieving sustainable management under the RMA. • The NZCPS sets matters of national importance, including environmental preservation and values of importance to tangata whenua, and guides local authorities on how to manage and set objectives for their coastal environments. It also places a mandatory requirement on regional councils to prepare a regional coastal plan.
National Policy Statement for Freshwater Management 2014	<ul style="list-style-type: none"> • The National Policy Statement for Freshwater Management 2014 (NPS-FM) directs local authorities on how to carry out their RMA responsibility for managing freshwater. • The NPS-FM requires regional councils, in consultation with their communities, to set objectives for the state of freshwater, like lakes, rivers and streams in their regions, and ensure that resource use does not prevent these objectives from being met
Auckland Unitary Plan	<ul style="list-style-type: none"> • The Auckland Unitary Plan became 'Operative in Part' in November 2016. It is the first combined plan for the Auckland Region and functions as Auckland Council's Regional Policy Statement, Regional Plan and Regional Coastal Plan. The Unitary Plan provides the supporting framework for growth, determining what can be built and where – it determines how we will create a higher quality, compact city, which has environmental benefits.

2.2.2 Further Environmental and Cultural Heritage Legislation

In addition to the responsibilities conveyed by the RMA, Auckland Council has responsibilities defined in other legislation in relation to the natural environment and cultural heritage. Table 3 outlines relevant legislation, with further detail provided in Appendix 1.

Table 3 Other environmental legislation relevant to Auckland Council

Other Environmental and Heritage legislation	
Local Government (Auckland Council) Act 2009	<ul style="list-style-type: none"> Local Government (Auckland Council) Act 2009 (LGACA) established Auckland Council as the Unitary Authority for Auckland and defines its structure, functions and how Auckland Council will operate. It requires Auckland Council to develop and adopt a spatial plan.
Biosecurity Act 1993	<ul style="list-style-type: none"> The Biosecurity Act 1993 is intended to control the spread and effect of unwanted organisms, establishing border controls and identifying the responsibilities of government departments and regional councils. Regional councils are required to perform monitoring and surveillance of established pests, like kauri dieback or marine pests like Mediterranean Fanworm (Sabella).
Heritage NZ Pouhere Taonga Act 2014	<ul style="list-style-type: none"> The Heritage New Zealand Pouhere Taonga Act 2014 (the Act) replaced the Historic Places Act 1993. The Act aims to assist in the identification, protection and conservation of the historical and cultural heritage of New Zealand.
Hauraki Gulf Marine Park Act 2000	<ul style="list-style-type: none"> The Hauraki Gulf Marine Park Act 2000 provides special recognition for the Hauraki Gulf as a nationally significant environment, worthy of special protection and management for its habitats and species.
Marine and Coastal Areas Act (Takutai Moana) 2011	<ul style="list-style-type: none"> The Marine and Coastal Areas Act (Takutai Moana) Act 2011 was created to replace the controversial Foreshore and Seabed Act 2004 and restore the customary interests extinguished by that Act. It acknowledges the importance of the marine and coastal area.
Collective Redress Act 2014	<ul style="list-style-type: none"> Under this Act, ownership of 14 Tūpuna Maunga were transferred to the 13 iwi/hapū of Ngā Mana Whenua via the collective's legal entity, the Tupuna Taonga o Tāmaki Makaurau Trust.
Waitakere Ranges Heritage Area Act 2008	<ul style="list-style-type: none"> The Waitakere Ranges Heritage Area Act 2008 (the WRHAA) provides direction for Auckland Council in making policy and planning decisions relating to the Waitakere Ranges Heritage Area (around 27,000 ha).

2.2.3 Auckland Council Strategies

To support Auckland Council's implementation of its directions, a suite of strategies have been developed to guide Auckland Council's direction. Table 4 outlines relevant strategies, with further detail provided in Appendix 1.

Table 4 Relevant Auckland Council Strategies

Auckland Council Strategies	
<u>Low Carbon Auckland</u> 2014	<ul style="list-style-type: none"> Describes how Auckland will progress its transformation towards a sustainable, low carbon future. Five key transformational changes in travel, energy use, green infrastructure, waste and natural carbon assets are outlined to support this transition. This strategy will be superseded by the Auckland Climate Action Plan, which is currently in development.
<u>Auckland Growing Greener</u> 2016	<ul style="list-style-type: none"> Describes Auckland Council's role and commitments to deliver the environmental outcomes for Auckland that underpin the Auckland Plan vision.
<u>Auckland Design Manual</u>	<ul style="list-style-type: none"> A tool for explaining the importance of good design and helping people to understand how to achieve good outcomes for their project. Of relevance to this paper, it guides the design and planting of parks and open spaces and the development of greenways plans.
<u>SeaChange Tai Timu Tai Pari</u> 2016	<ul style="list-style-type: none"> A collaborative Marine Spatial Plan produced by an independent working group, and released in December 2016. SeaChange is non-statutory and non-binding on agencies. The plan sets an ambitious vision for the Hauraki Gulf, aiming to elevate the health of the Hauraki Gulf.
Tūpuna Maunga Integrated Management Plan 2016	<ul style="list-style-type: none"> Sets the direction for future management of the Tūpuna Maunga, including the protection, restoration and enhancement of all the Tupuna Maunga in an integrated manner.
<u>Regional Parks Management Plan</u> 2010	<ul style="list-style-type: none"> Sets out a vision and management framework for the next 10 years for 23 of the 26 regional parks (almost 40,000 hectares) owned and/or managed by Auckland Council.
<u>Proposed Regional Pest Management Plan</u> 2018	<ul style="list-style-type: none"> The current plan expires in December 2017. The proposed plan, which was consulted on in March 2018, will provide a statutory and strategic framework for effective management of plant and animal pests in the Auckland region in line with the National Policy Direction for Pest Management 2015.

Auckland Council Strategies	
Parks and Open Spaces Strategic Action Plan 2012	<ul style="list-style-type: none"> Set a 10 year framework for managing Auckland’s parks and open space network over the next 10 years to implement the aims of the Auckland Plan.
<u>Indigenous Biodiversity Strategy 2012</u>	<ul style="list-style-type: none"> Sets strategic priorities for managing, funding and improving outcomes for indigenous biodiversity in Auckland.
<u>Urban Forest Strategy 2018</u>	<ul style="list-style-type: none"> Sets out a vision and three main objectives for improving and protecting Auckland’s urban forest.
Integrated Catchment Management plans	<ul style="list-style-type: none"> As part of Auckland Council’s implementation of the NPS-FM, are watershed-based plans designed to improve freshwater environments.
<u>Draft Waste Management and Minimisation Plan 2018</u>	<ul style="list-style-type: none"> To support reducing waste, reusing and recycling more, the draft Waste Management and Minimisation Plan 2018 sets a zero waste goal by 2040. Consultation closed in March 2018. The final plan will be released later this year.
<u>Open Space Strategic Asset Management Plan 2015 - 2025</u>	<ul style="list-style-type: none"> Recognises that as the city grows there will be increasing demands on our parks and open space networks. These places provide connection to the environment, places to recreate and are important contributors to people’s sense of place.
<u>Stormwater Asset Management Plan 2015 - 2045</u>	<ul style="list-style-type: none"> Determines how we manage our stormwater, supports the use of green infrastructure and minimisation of contaminants making it into the environment.
<u>Watercare Asset Management Plan 2016 - 2036</u>	<ul style="list-style-type: none"> Defines how and where drinking water and wastewater services are provided.

2.3 Demographics and Trends Pertinent to Outcome

This section summarises the key trends that have informed the development of the directions and focus areas outlined in the Environment and Cultural Heritage outcome of the Auckland Plan 2050.

Current State: Where are we at now?	
Main Report	<p>Key Report: State of Environment Report 2015</p> <p><i>Highlights</i></p>
Climate	<p>Rainfall</p> <ul style="list-style-type: none"> Rainfall is highly variable over time across the region. There is no consistent trend in rainfall. Days with significant rainfall and dry spells occur across Auckland, with large variability from year to year and for longer time scales.

Current State: Where are we at now?		
	Sea Levels	<ul style="list-style-type: none"> Long-term measurements in Auckland Harbour by Ports of Auckland Limited show a clear trend of rising sea level of 1.5mm/year over more than 100 years. These rising sea levels are in line with local and global averages.
	Temperature	<ul style="list-style-type: none"> The annual average air temperature at Onehunga (longest dataset) is 15.6°C. The average sea surface temperature over the last 20 years was 17.11°C. Stream monitoring shows that urban streams are warmer than forest streams.
	Rainfall	<ul style="list-style-type: none"> Rainfall is highly variable over time across the region. There is no consistent trend in rainfall. Days with significant rainfall and dry spells occur across Auckland, with large variability from year to year and for longer time scales.
Land	Biodiversity	<ul style="list-style-type: none"> Biodiversity values are higher in the larger forests, such as in the Waitākere and Hunua ranges, and also on Hauraki Gulf islands where native habitat remains and control efforts mean pest animals are absent or in lower numbers. Diversity of native plants and birds is reduced in mainland areas modified by farming and urban growth.
	Biosecurity	<ul style="list-style-type: none"> Biosecurity management can be effective in keeping down the populations of mice, rats and possums. This is exemplified by the work being done in places like Ark in the Park (Waitākere Ranges), Glenfern and Windy Hill (on Aotea-Great Barrier Island) and by the high biodiversity values of pest-free islands such as Hauturu/ Little Barrier.
	Threatened species	<ul style="list-style-type: none"> The previous State of the Environment report (State of the Auckland Region 2010) identified the relatively large proportion of threatened species living in the region. Auckland Council’s biodiversity team has since put in place a prioritisation protocol and is currently managing 38 species, up from 14. Additional species are also managed within the parks network by council staff and through community initiatives.
	Weeds	<ul style="list-style-type: none"> Larger native forest tracts are resistant to invasion and have fewer weeds. Urban and rural forest patches are more exposed and show much higher infestation levels.

Current State: Where are we at now?		
Water	Freshwater	<ul style="list-style-type: none"> Freshwater quality and ecology is rated excellent in catchments dominated by native forest, good to fair in catchments dominated by exotic forest and/or rural land use and poor in catchments dominated by urban land use. Poor water quality in rural catchments is generally low due to high nutrient levels and sediment. Many of Auckland's urban streams are in poor health as a result of the many pollutant sources in urban environments.
	Marine	<ul style="list-style-type: none"> Contaminants in marine sediments tend to be low in less developed and rural areas, with fewer inputs from urban stormwater. Hotspots of contamination tend to be in muddy estuaries and sheltered tidal creeks receiving runoff from older, intensively urbanised or industrialised catchments. The worst-affected areas are central Waitematā Harbour and Tāmaki Estuary.
Air	Air quality	<ul style="list-style-type: none"> In general Auckland's air quality is good, with pollutants largely below guidelines, standards and targets. However, from time to time these are still breached.
	PM ₁₀	<ul style="list-style-type: none"> Concentrations of PM₁₀ (particulate matter up to 10 micrometres in size) in urban Auckland have significantly decreased due to source management programmes, cleaner fuels, lower vehicle emissions and declining use of solid fuels for home heating. However, in certain areas we are still in danger of breaching air quality standards. The number of exceedances for PM₁₀ has decreased from 17 days in 2005 to zero in 2014.
	NO ₂	<ul style="list-style-type: none"> Concentrations of nitrogen dioxide (NO₂) at all of the worst sites are decreasing due to the improved efficiency of diesel engines. Decreasing levels of NO₂ in Queen Street are also due to diverting traffic away from the area. The worst locations are Newmarket and the CBD where concentrations still occasionally exceed air quality standards and guidelines.

Current State: Where are we at now?	
Other documents	<ul style="list-style-type: none"> • Cultural Heritage Inventory (CHI) (https://chi.net.nz) • State of Auckland 2015 • OECD Environmental Performance Review: New Zealand 2017 • Off the Track. State of the Nation Report 2017 • State of our Gulf 2017 • Colmar Brunton Better Futures Report 2016 • Quality of Life Report 2016

2.4 Opportunities and Challenges

This section summarises the main challenges and opportunities facing Auckland's environment and cultural heritage over the next 30 years. These challenges and opportunities have shaped the development of the directions and focus areas outlined in the Environment and Cultural Heritage outcome of the Auckland Plan 2050.

The main challenges associated with the protection and enhancement of Auckland's natural environment and cultural heritage include:

- The ongoing decline in the quality of Auckland's natural environment and cultural heritage (Auckland Council, 2015), which indicates that our current directions and approaches have been insufficient.
- The apparent contradiction between Auckland's continued growth and the impacts that this growth has had historically on Auckland's natural environment and cultural heritage (see for example EDS, 2016).
- The effects of climate change, which may have direct and indirect impacts on our natural environments and sites of cultural heritage. The Auckland Region climate change projections and impacts report prepared by NIWA for Auckland Council in November 2017 (NIWA, 2017) provided, for the first time, projected impacts of climate change for the Auckland region. Examples of direct impacts include climate change-induced flooding and coastal erosion. Indirect impacts could include changes in where and how Aucklanders must live in order to adapt to an altered climate. For example, areas of the Auckland region may become uninhabitable, whilst goods and services that are currently commonplace, may be more difficult to access due to difficulties in production, or in transportation from their places of origin/production.
- A lack of appreciation of the value provided by Auckland's natural environment and cultural heritage and a failure to integrate these values into our decision making (see for example EDS, 2016).

However, there are also numerous areas of opportunity that can be leveraged, including:

- The potential for a growing Auckland to provide critical mass to do things on a large scale and realise broad socio-cultural, economic and environmental benefits.
- The increasing availability of innovative, low impact and cost-effective approaches/technologies to protecting and enhancing our natural environment and cultural heritage.

- The higher level of expectation on sustainability and environmental protection within the general public and better appreciation of the opportunities to deliver long-term wins over short-term trade-offs.

3 Evidence

This section presents the supporting evidence for the Environment and Cultural Heritage outcome of the Auckland Plan 2050 and has been structured into three distinct parts.

- In the first part (Section 3.1), the rationale behind the outcome's integrated approach to Auckland's environment and cultural heritage is presented. This integrated approach has framed the overall directions proposed within the Environment and Cultural Heritage outcome.
- In the second part (Section 3.2), the overall decline in Auckland's resources is discussed alongside the key drivers of this decline. Addressing the significant role played by Auckland's ongoing growth and development in this decline is a central focus of the proposed directions and focus areas for the Environment and Cultural Heritage outcome.
- In the final part of this chapter (Sections 3.3 to 3.6), further detail on key areas of environmental decline which have informed the specific focus areas for the Environment and Cultural Heritage outcome, e.g. water and green infrastructure, are presented.

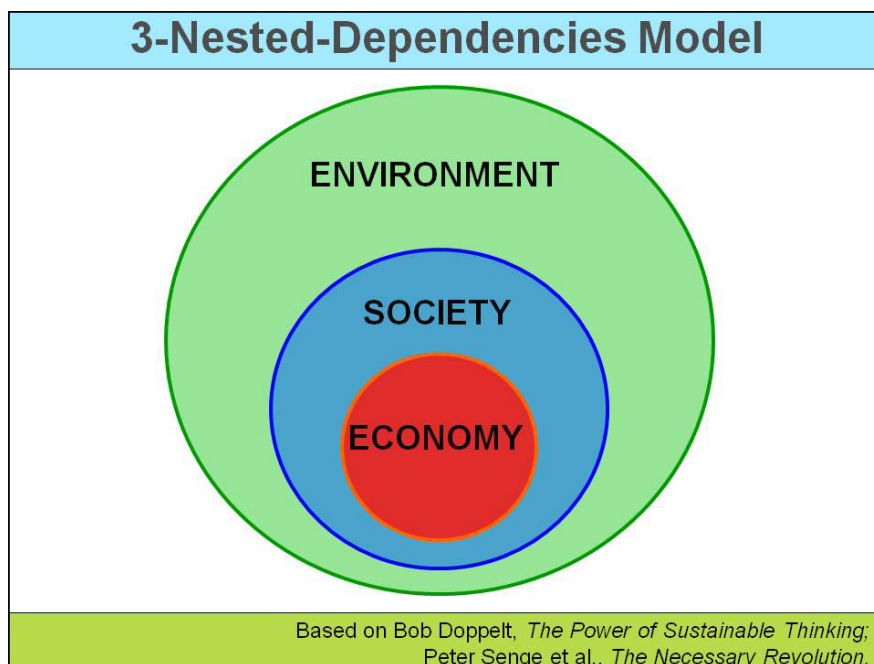
3.1 An Integrated Approach

This outcome draws together the natural environment and cultural heritage aspects that were addressed separately within the 2012 Auckland Plan through Direction 4 and Direction 7. Drawing these two aspects together and integrating associated themes such as Climate Change (Direction 8) and Māori perspectives (Direction 2) aligns with the overall objectives of delivering a more streamlined and integrated Plan. In addition, taking a more integrated approach to managing our environment and cultural heritage has been shown to deliver a range of benefits. The following section outlines the rationale for, and key benefits associated with, taking this integrated approach.

3.1.1 Strengthening the Environment and People Link

As noted in the 2012 Auckland Plan, "Auckland's environment and its people are intertwined. People depend on the life-supporting services it provides" (Auckland Council, 2012a:175). This view reflects contemporary discourse on sustainable development, such as the environmentally based planetary limits (Rockström et al., 2009) which frame the social and economic aspects of sustainability as well as the nested dependencies model of sustainability (Doppelt, 2008; see Figure 4).

Figure 4 The Nested Dependencies Model (Source: Sustainability Advantage, <http://sustainabilityadvantage.com/2010/07/20/3-sustainability-models/>)



This strong link between environment and people is particularly relevant within the Auckland and New Zealand context given Te Ao Māori perspectives which draw together whenua (the land) and tangata (the people) (Ministry for the Environment, 2015). Through the Auckland Plan 2050, this has been taken further, with the Independent Māori Statutory Board noting that Māori wellbeing cannot be separated from the environment.

Despite the presence of this link between environment and people, it is apparent that many of the negative environmental trends we are experiencing in Auckland stem from the actions and activities of people. These impacts include:

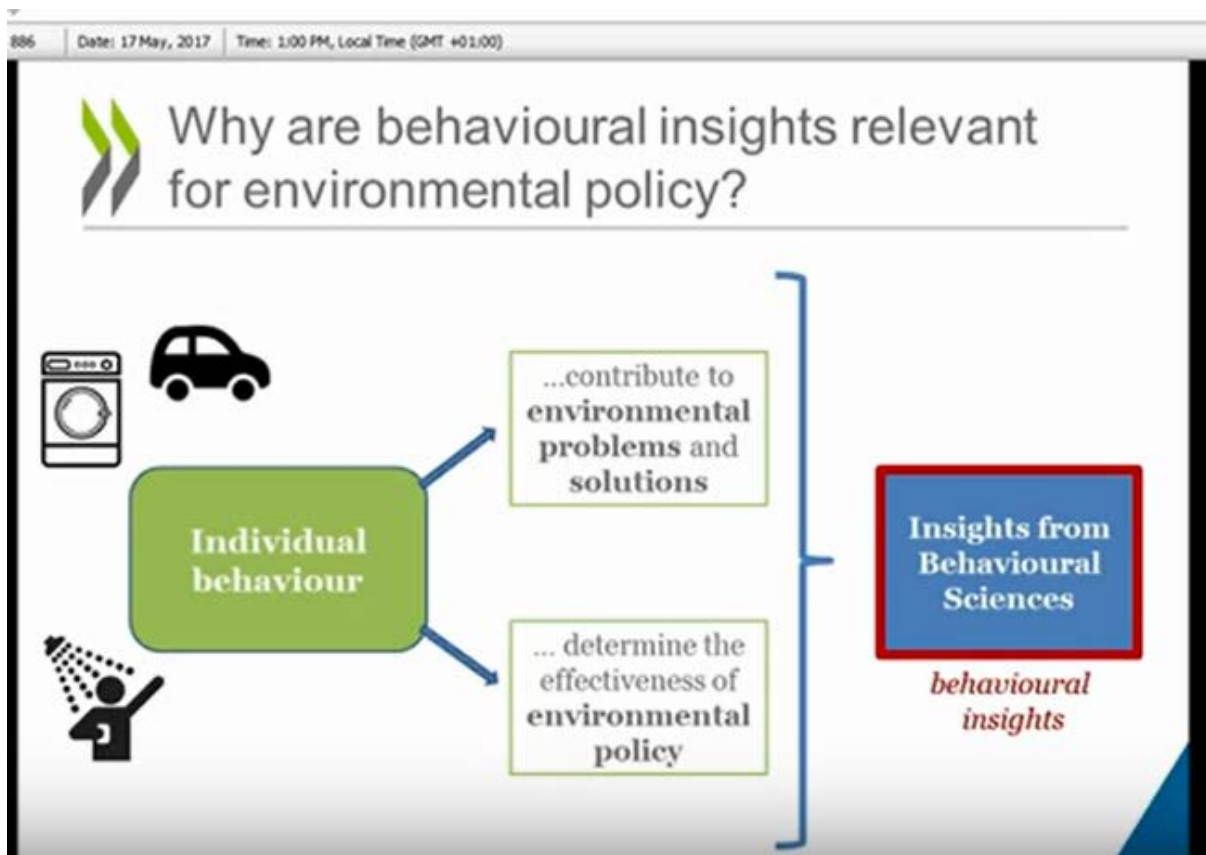
- the effect of our combined sewer systems, agricultural activity and development activity on the region's water courses
- the loss of habitat and contamination of our soils associated with our changing land uses
- emissions from our industrial activities and transport systems affecting the quality of our air.

At a global scale, the evidence has highlighted the human contribution to the changing climate (see Intergovernmental Panel on Climate Change, www.ipcc.ch), whilst the rate and mode of economic and population growth has increased its exposure and vulnerability to natural disasters (Lam, 2012). At a local level, EDS has noted that the decline in indigenous biodiversity and ecosystem services has been "due to private interests in extraction and degradation usually prevailing over the public interest in safeguarding nature" (EDS, 2016).

Despite the environment consistently being identified as important to Aucklanders (Crothers, no date; Market Economics, 2011), the increasing disconnect between people and the environment seen globally, is also being experienced locally (Gelsthorpe, 2017; Kesebir & Kesebir, 2017; Stanley et al. (2015)). EDS (2016) notes that “many people are disconnected from nature and therefore do not invest their time and resources in seeking its protection, resulting in biodiversity often being excluded from decision-making.” The recent OECD Environmental Performance Review for New Zealand (OECD, 2017A) also highlights that policies to reduce the environmental impacts of sprawling cities have been prevented in part by a “lack of community support.”

Recognition of this paradox between the importance placed by people on the environment, their understanding of the broader values and benefits provided by the environment, as well as their actions and decisions has led to a focus on behaviour-based approaches to environmental protection and sustainability more broadly (Amel et al., 2017). The OECD, for example, note that behavioural insights can help policy makers obtain a deeper understanding of the behavioural mechanisms contributing to environmental problems, and design and implement more effective policy interventions (OECD, 2017b; see Figure 5).

Figure 5 Behavioural Insights and Environmental Policy (Source: OECD, 2017b)



3.1.2 Strengthening the Link between the Natural Environment and Cultural Heritage

As noted in the 2012 Auckland Plan, the challenges associated with environmental protection outlined previously (public awareness, decision-making and behaviour change) are also exhibited in the context of heritage protection. For example, despite a survey of Aucklanders identifying a high level of importance placed on heritage (88%), a large proportion of the respondents (54%) also believe that heritage is “not well understood in their area” (Auckland Council, 2012b:126).

The 2012 Auckland Plan notes that the focus for heritage management centres on better understanding our heritage, valuing it and sharing stories about it (Auckland Council, 2012b). In doing so, greater enjoyment of our heritage can be fostered along with a more collective stewardship by the community and tangata whenua (see Figure 6).

Figure 6 Managing Auckland's Heritage (Source: Auckland Council, 2012b)



In addition to the synergies between environmental and heritage protection, within the Auckland context there is also a strong connection between our cultural heritage and the natural environment. This connection is not limited to the links between Māori cultural heritage and Auckland’s natural environment, but also the natural features that have shaped the identity and heritage of non-Māori Aucklanders. For example, the 2012 Auckland Plan notes:

Auckland has its roots in the natural topography and coastal environment, which has been shaped over the centuries by natural events as well as people, their needs and their aspirations. Our rich and diverse historic heritage... encompasses the extensive archaeological landscapes of Āwhitu Peninsula, the Auckland Isthmus volcanic cones, the Ōtuataua stone fields and the Franklin volcanic fields... Our heritage places comprise sites, features, areas, townscapes, streetscapes, landscapes, settlements and other historical places. We value them as outstanding features in the Auckland landscape, and appreciate both their natural and human-made elements. (Auckland Council, 2012b:125)

Since the first Māori settlers, people have been drawn here because of the natural environment. It is beautiful; from rugged, wild, black-sand west coast beaches to sheltered, golden coves and islands. Auckland is spacious with its 'low land, high sky and wide water' – an open green and blue landscape. (Auckland Council, 2012a:175)

Drawing together the protection and enhancement of our natural environment and cultural heritage into an integrated outcome simply strengthens the existing link expressed in the 2012 Auckland Plan. Furthermore, reinforcing that the natural environment is a foundational component of Aucklanders' shared cultural heritage also strengthens the behaviour-led approach to environmental and heritage protection outlined previously.

The integration of cultural and natural heritage reflects global efforts, such as the IUCN (International Union for the Conservation of Nature) and ICOMOS (International Council on Monuments and Sites) (IUCN, no date). UNESCO also notes that: "*The most significant feature of the 1972 World Heritage Convention is that it links together in a single document the concepts of nature conservation and the preservation of cultural properties. The Convention recognizes the way in which people interact with nature, and the fundamental need to preserve the balance between the two.*" (<https://whc.unesco.org/en/convention/>)

3.2 Our Declining Resources

Despite efforts to improve and maintain environmental quality, the state of Auckland's environment has been declining or staying stable at an already degraded state for some time. The increasing pressure on Auckland's environments is both directly and indirectly linked to Auckland's growth as well as the decisions and actions of Aucklanders. Some of the key pressures affecting Auckland's natural environment and cultural heritage include:

- pressure from growth of urban areas
- increasing population
- competing uses and values of environments
- introduced animal and plant pests
- introduced micro-organisms

- climate change
- emissions from home heating, vehicles and industry
- ageing and degraded infrastructure.

These pressures have impacts on the environment. The environment can tolerate a certain level of impacts, but cumulative impacts will gradually affect the quality of the environment we enjoy, resulting in changes to its state. Key changes in the Auckland region have been:

- degraded freshwater environments, particularly urban and rural streams
- degraded harbours, estuaries and marine environments
- degraded soil and groundwater
- elevated emissions, particularly in winter
- increasing greenhouse gas emissions.

This section, along with the subsequent sections focussed on specific environmental parameters (Sections 3.3 to 3.5), provide further detail on the current state of our fresh and marine water, land and air as well as the major contributors to their current state. The evidence presented has shaped the focus of the Environment and Cultural Heritage outcome on the root causes of these impacts noted above, namely Auckland's growth and development and associated aspects such as our ageing infrastructure as well as the actions and decisions of Aucklanders.

3.2.1 Decline in Environmental Quality

The decline in Auckland's environmental quality has been measured by long term environmental monitoring, reported in State of Environment Reports (Auckland Regional Council, 2009b; Auckland Council, 2015). The reports have long highlighted declining environmental quality, and degraded environments which were remaining degraded, rather than improving. These declines were most notable in freshwater and marine environments, with smaller gains made in air quality and biodiversity values in certain highly protected areas across the two State of Environment Reports.

3.2.2 Decline in Land Environments

Between 2005 and 2015, the composition of Auckland's landcover (e.g. farmland, native forest and exotic forestry) stayed mostly the same, but there were some major local changes, particularly in growth areas as they are developed to accommodate Auckland's increasing population. Diversity of the species these environments support varies across the region, with higher biodiversity values in larger, more intact forests, like the Waitakeres and Hunuas. On the Hauraki Gulf islands, intensive pest control has supported biodiversity values, allowing a higher species diversity, and allowing unique species like kauri to thrive.

Auckland's growth has modified the region's natural landscapes. In some areas, this impact is more pronounced than in others, resulting in differences in natural features like the urban forest. Auckland's urban forest makes up 18 per cent of urban areas, with the lowest cover in light industrial areas and those with higher density and building heights. Protection of the urban forest is 50-50; 50 per cent has some protection and 50 per cent has no protection at all. Significant Ecological Areas protect 62 per cent of the protected trees in the region. Half of all trees are higher than 10m, and provide a wider range of environmental benefits, like habitat, shade and carbon storage than smaller trees (Bishop and Laurence, 2017).

Land environments are also under pressure from biosecurity risks. Kauri Dieback, a pathogen which attacks kauri, has been present in the Auckland region for several years, now infects 19 per cent of kauri, mostly concentrated in areas most popular for walking. Continued infection will mean that kauri may be completely lost as a species in Auckland. Similarly, in 2017 the Myrtle rust fungus was also discovered in the region.

Activities on land have also affected the quality of the region's soils, particularly in rural environments where excessive fertiliser application and soil compaction reduces soil quality and encourages runoff (Curran-Cournane, 2015). Heavy metals, like copper (from fungicides) in rural environments, and nickel, lead and zinc in urban areas also have an impact on soil quality in the region (Auckland Regional Council, 2001; Curran-Cournane et al., 2015). Higher class soils, which have the versatility to support agricultural activities like market gardens, are under pressure from growth and development, particularly in southern growth areas (Curran-Cournane et al., 2014; Greenhalgh et al., 2017).

3.2.3 Degraded Marine Environments

Activities on land eventually have a downstream impact on the marine environment, resulting in reduced environmental quality. These issues are compounded by the diversity of uses and values in the marine environment, like recreation, customary harvest, tourism, species protection and commercial fishing.

State of the Gulf reporting has consistently found that most environmental indicators are showing negative trends, or are staying stable at already degraded levels (Hauraki Gulf Forum, 2011; 2014; 2017). The 2017 State of the Gulf report highlighted several areas of decline in the Hauraki Gulf:

- pressure from fishing – estimated declines in snapper and crayfish stocks of 70-80 per cent, and commercial trawling methods occurring in sensitive ecological areas
- heavy metal run off from urban areas contaminating sediments
- high nutrient input from farming areas, particularly in the Firth of Thames
- wastewater overflows which occasionally breach swimming safety guidelines
- litter in the marine environment

- high sediment accumulation rates, and high suspended sediment levels and impact on ecology
- invasive marine species like Mediterranean fan worm
- ship strike and marine mammals
- pressure on seabirds for habitat and food.

Despite these negative trends, there have been some localised successes in the Hauraki Gulf, particularly around Bryde's Whale and managing ship speeds to lessen fatal collisions (Hauraki Gulf Forum, 2017). These impacts are further explained in the following sections.

3.3 Fresh and Marine Water Quality

This section presents the current state of our fresh and marine water quality as well as the major contributors to their current state. As noted previously, the intent of the Environment and Cultural Heritage outcome is to address the root causes of these impacts, such as Auckland's growth and development, our ageing infrastructure as well as the actions and decisions of Aucklanders.

3.3.1 Overview

Degraded marine and freshwater environments reflect historic and current inputs of sediment and contaminants from urban land uses, like roads, housing and industrial activities. In rural areas nutrients and sediments from rural activities also have a negative effect on water quality. Freshwater quality across Auckland (Figure 7) ranges from excellent in catchments with predominantly native vegetation cover, good or fair in those with exotic forest and rural landuse, and is generally poor in urban catchments (Auckland Council, 2015; Hamil & Lockie; 2015; Holland et al., 2016). The range in freshwater quality across the region reflects the diversity of issues and associated contaminants impacting on freshwater quality (Figure 7).

Freshwater monitoring shows a clear pattern between the catchment land use and water quality and ecological health. Sites in a poor state are generally in urban catchments, while those within native forest with little human influence are generally in a better condition. This trend has long been evident across the 36 sites regularly monitored by the State of Environment monitoring program (Auckland Regional Council, 2008; Lockie & Neale, 2014; Holland & Buckthought, 2015). Results for 2015 classified only 4 of the 36 sites as having 'excellent' water quality. Nine sites were classified as 'good' and the remainder were 'fair' and 'poor' (Holland et al., 2016).

Based on these results and trends in river water quality since the 2009 State of Environment report (Auckland Regional Council, 2009b), State of Environment monitoring identified three major issues for freshwater quality in the region, across streams, lakes and

groundwater; urban stream syndrome; pest plants and fish; and, high nitrate concentrations in groundwater respectively (Auckland Council, 2015).

The range of issues identified in Figure 7 and their spread across the region is captured by Auckland Council’s freshwater and marine monitoring programs (Figure 8, Figure 10, Figure 11 and Figure 14), concentrating on the current state of freshwater and marine water quality, using four indicators of quality – faecal contamination, nutrients, sediment and heavy metals.

Figure 7 Water quality issues in Auckland and contaminants generated (Source: Auckland Council, 2017a)

Issue	Relevant contaminants or stressors
Wastewater overflows in reticulated areas	<ul style="list-style-type: none"> • Faecal pathogens • Nutrients • Metals • Industrial chemicals • Litter • Habitat degradation
Wastewater overflows from onsite wastewater systems	<ul style="list-style-type: none"> • Faecal pathogens • Nutrients • Industrial chemicals • Habitat degradation
Dumping in waterways	<ul style="list-style-type: none"> • Metals • Polycyclic aromatic hydrocarbons • Industrial chemicals • Litter • Habitat degradation
Discharges from new urban development or urban renewal projects	<ul style="list-style-type: none"> • Sediment • Metals • Stream flow changes • Litter • Habitat degradation
Discharges from existing land use	<ul style="list-style-type: none"> • Sediment • Faecal pathogens from animals • Metals • Industrial chemicals • Litter • Stream flow changes • Habitat degradation
Discharges from roads	<ul style="list-style-type: none"> • Sediment • Metals • Polycyclic aromatic hydrocarbons • Industrial chemicals • Litter • Stream flow changes • Habitat degradation
Point source discharges from landfills, industry and contaminated sites	<ul style="list-style-type: none"> • Sediment • Nutrients • Metals • Polycyclic aromatic hydrocarbons • Industrial chemicals • Litter • Stream flow changes • Habitat degradation
Discharges from marinas and boating	<ul style="list-style-type: none"> • Sediment • Faecal pathogens • Polycyclic aromatic hydrocarbons • Metals • Industrial chemicals • Litter
Rural land management	<ul style="list-style-type: none"> • Sediment • Nutrients • Faecal pathogens from animals • Metals • Habitat degradation • Industrial chemicals • Stream flow changes
Modified streams, lakes, wetlands and coastal areas	<ul style="list-style-type: none"> • Stream flow changes • Habitat degradation

3.3.2 Water Quality: Faecal Contamination

Across the region, faecal contamination (Figure 8) from poorly performing stormwater and wastewater networks in urban areas, poorly performing septic tank systems in some regions (Noble & Neale, 2016) and from agricultural runoff in rural areas results in freshwater and marine environments being below required national guidelines for much of the time (Walker et al., 2015; Snelder et al., 2016; MfE, 2017; McBride & Soller, 2017). In 2017, a national modelling program run by the Ministry for the Environment found that 23 per cent of Auckland rivers had ‘fair’ water quality for swimming (as measured by faecal contamination). Auckland lakes performed better with 34 per cent having ‘excellent’ water quality and 57 per cent having ‘good’ water quality (MfE, 2017; Figure 9). Faecal contamination also affects beaches, with 16 beaches permanently closed due to poor long term water quality (MartinJenkins, 2017; www.safeswim.org.nz).

Figure 8 Current state of faecal contamination (Source: Auckland Council, 2017b)

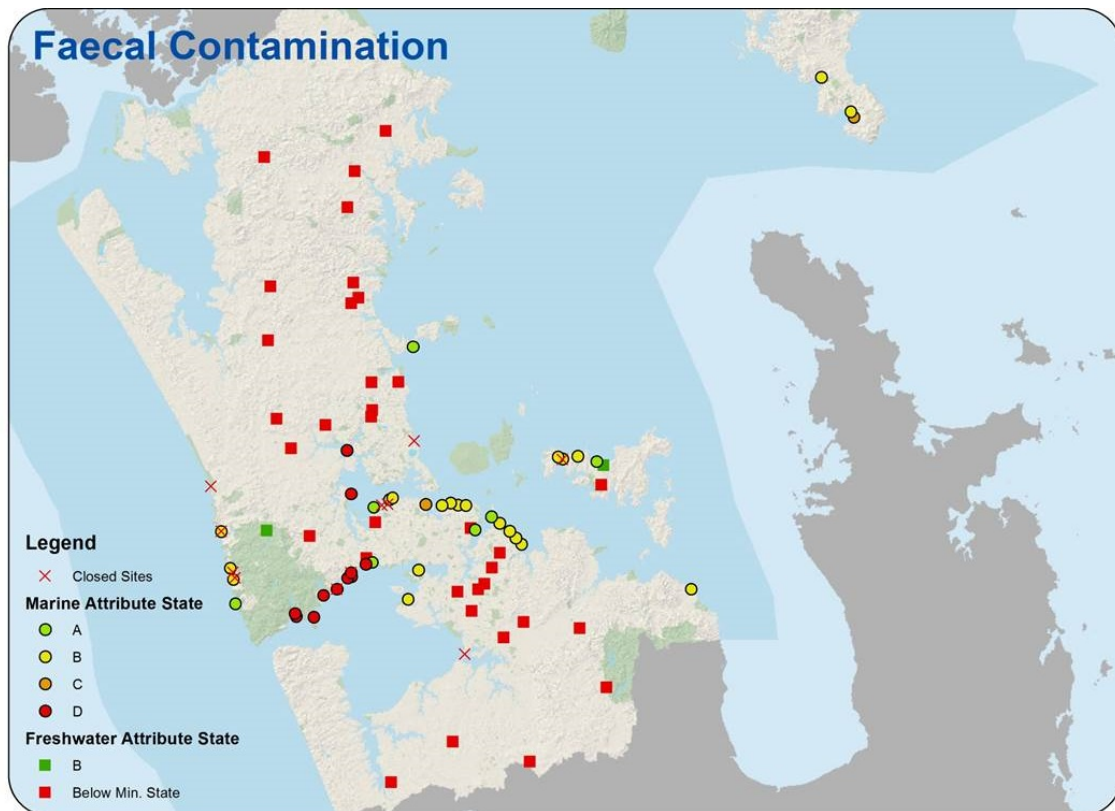
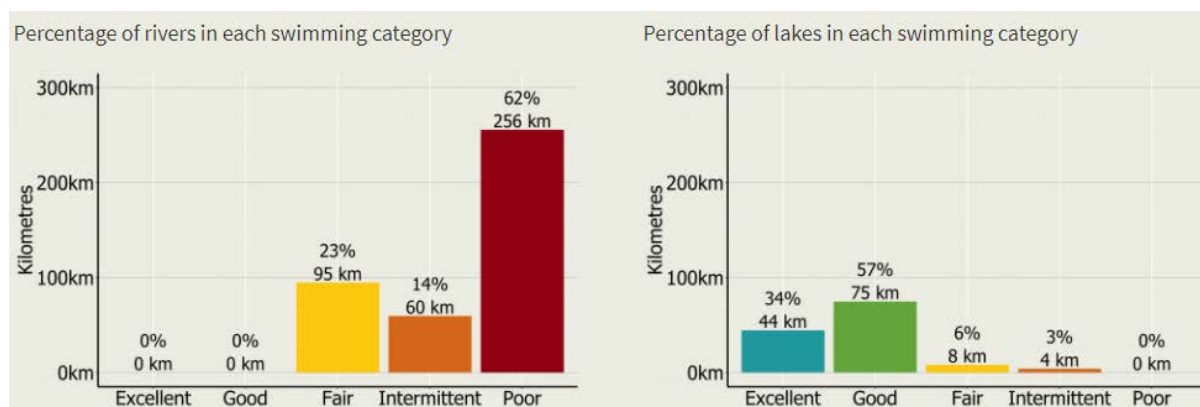


Figure 9 Suitability for Swimming in Auckland Rivers and Lakes (Source: Ministry for the Environment, <http://www.mfe.govt.nz/fresh-water/about-freshwater/auckland>)



3.3.3 Water Quality: Nutrients

Nutrients in freshwater and marine environments also exceed guidelines in parts of the region, (Figure 10) especially in areas of particularly high rural land use where fertilizer is extensively used. Extensive fertilizer use in rural areas has a downstream affect, with elevated concentrations in marine receiving environments like the upper Manukau and Kaipara harbours.

The 2015 State of Environment report (Auckland Council, 2015) identified nutrients in Franklin groundwater and streams as one of the most significant freshwater issues. These significant volcanic aquifers provide a valuable groundwater resource for irrigation and drinking water. Groundwater emerges at many springs in the region, interacting with nitrates, mostly as runoff from fertilizer application (Meijer et al., 2016), and as a result of high fertilizer application tracers in soil (Curran-Cournane et al., 2013). At many sites, nitrate concentrations exceed drinking water standards (ANZECC¹) and National Objectives Framework national bottom lines. Three groundwater sites also demonstrate significant increasing trends, and the Ngakaroa and Whangamairie streams exhibit an increasing nitrate trend and significantly elevated concentrations respectively (Meijer et al., 2016).

3.3.4 Water Quality: Invasive weeds

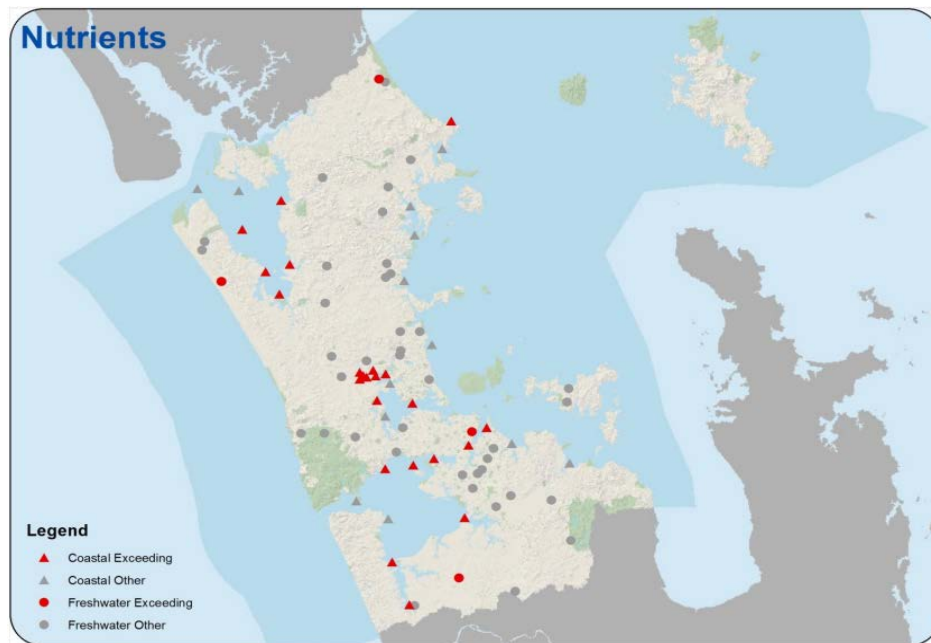
The 2015 State of Environment report (Auckland Council, 2015) identified hornwort, an invasive weed that threatens Auckland lakes, as one of three issues facing freshwater environments. Hornwort has negative impacts on biodiversity and water quality while also impacting on recreation and amenity value. Hornwort outcompetes more desirable native species (Auckland Council, 2015). Hamil and Lockie, (2015) found that hornwort was present in several lakes in the region, mainly associated with agricultural land uses (Lakes Kuwakatai, Kereta and Ototoa). Declines in hornwort were possible with intervention through grass carp stocking² (de Winton & Edwards, 2012; Hamil & Lockie, 2015), but are

¹ Australia and New Zealand Environment and Conservation Council.

² Grass carp *Ctenopharyngodon idella* are commonly introduced to lakes to control invasive weeds through feeding.

generally symptomatic of catchment scale land use, through nutrient run off. Pest fish, particularly Perch, have been associated with increased algal blooms and cyanobacteria risk. Perch also outcompete native species and can remobilise sediment. Coarse fish are present in all monitored lakes and have caused a notable decline in lake health.

Figure 10 Current state of nutrients (Rivers: Nitrate median >6.9mg/L and ammonia max. >2.20 mg/L (NPS 'D')). Lakes TN median > 800mg/m³ and TP median > 50mg/L (NPS 'D')). Coastal: median nitrate-nitrite N > 0.005mg/L. (Source: Auckland Council, 2017b)



3.3.5 Water Quality: Sediment

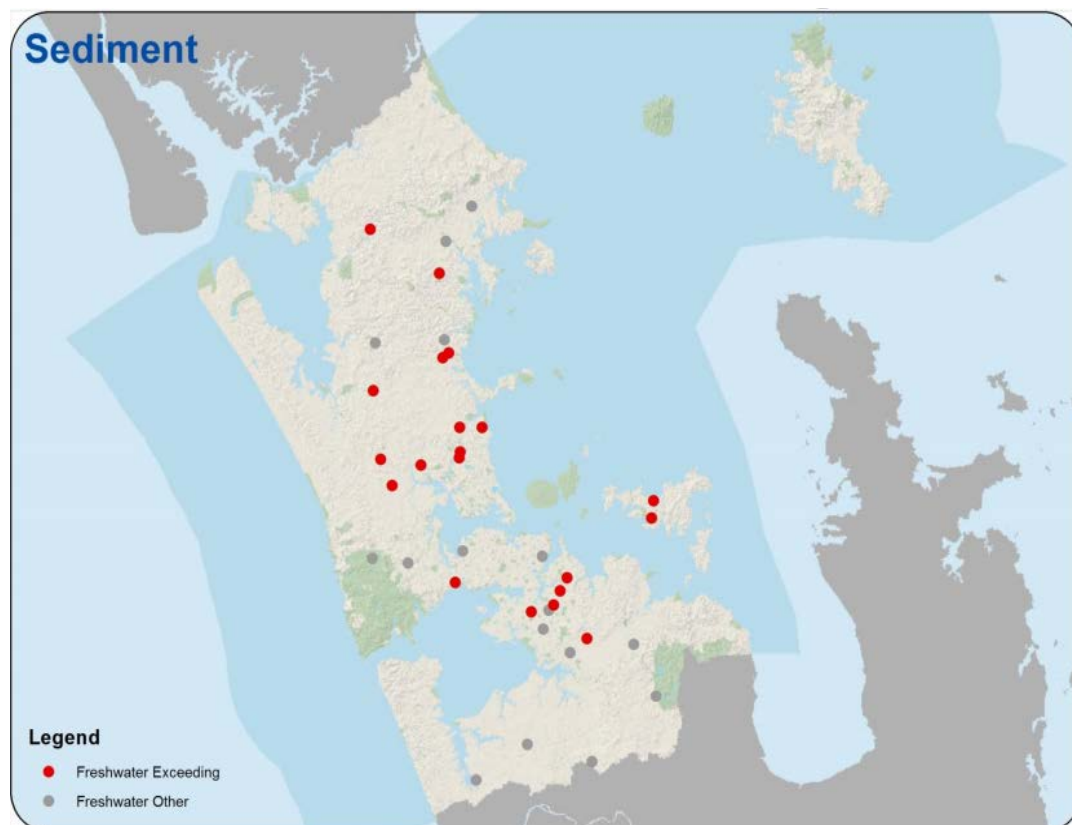
Sediment has a significant impact on water quality. In Auckland, a range of land uses and processes contribute to sediment concentrations in the freshwater and marine environment, including eroding stream banks, runoff from earthworks through land development and pasture and horticultural landuses, forestry and natural erosion (Auckland Council, 2015).

Curran-Cournane et al. (2013) reported sediment yields from 10 monitored catchments, finding that the sediment yields ranged from 32-80 t/km²/yr, and were considered broadly in line with results from similar work in the Waikato region. Steeper, less vegetated catchments yielded higher sediment concentrations, but this was highly susceptible to rain events and period of record. Hicks et al. (2009) found that sediment yields from forested areas were two thirds of those from pasture areas, while sediment from urbanised areas were one quarter of those from pasture. The earthworks phase of urban development is likely to have a higher sediment yield than all other land uses.

Figure 11 illustrates the monitored sites that have a median turbidity value of above 5.6 NTU (Nephelometric Turbidity Units). This method involves the use of a nephelometer that

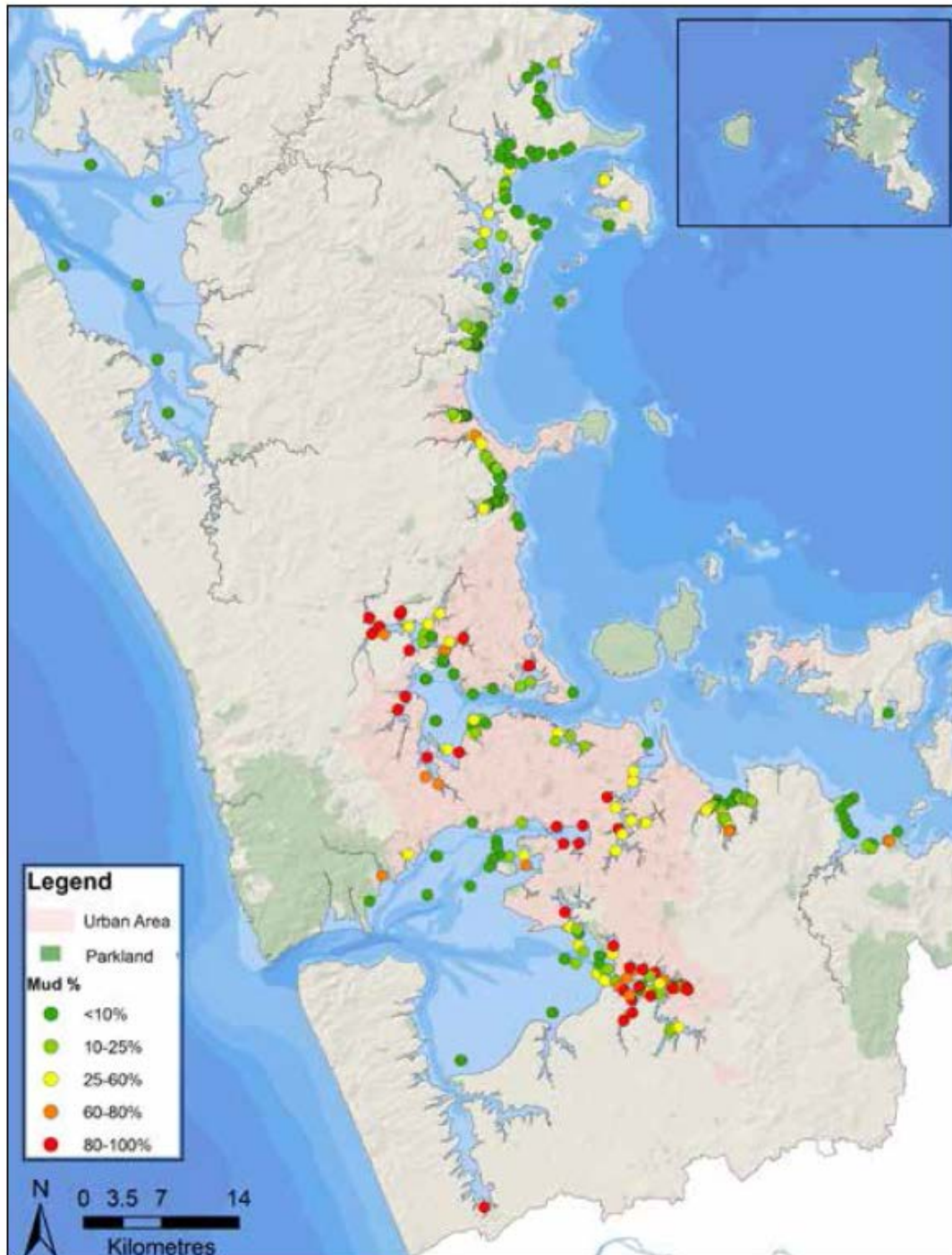
measures the amount of light that is reflected back from particulates in suspension. This is significant because according to the Australia & New Zealand Guidelines for Fresh & Marine Water Quality (National Water Quality Management Strategy), 5.6 NTU is considered the upper limit for unmodified or slightly disturbed lowland streams in New Zealand (most of Auckland streams are considered lowland).

Figure 11 Current state of sediment. Rivers: median water turbidity > 5.6 NTU (Source: Auckland Council, 2017b)



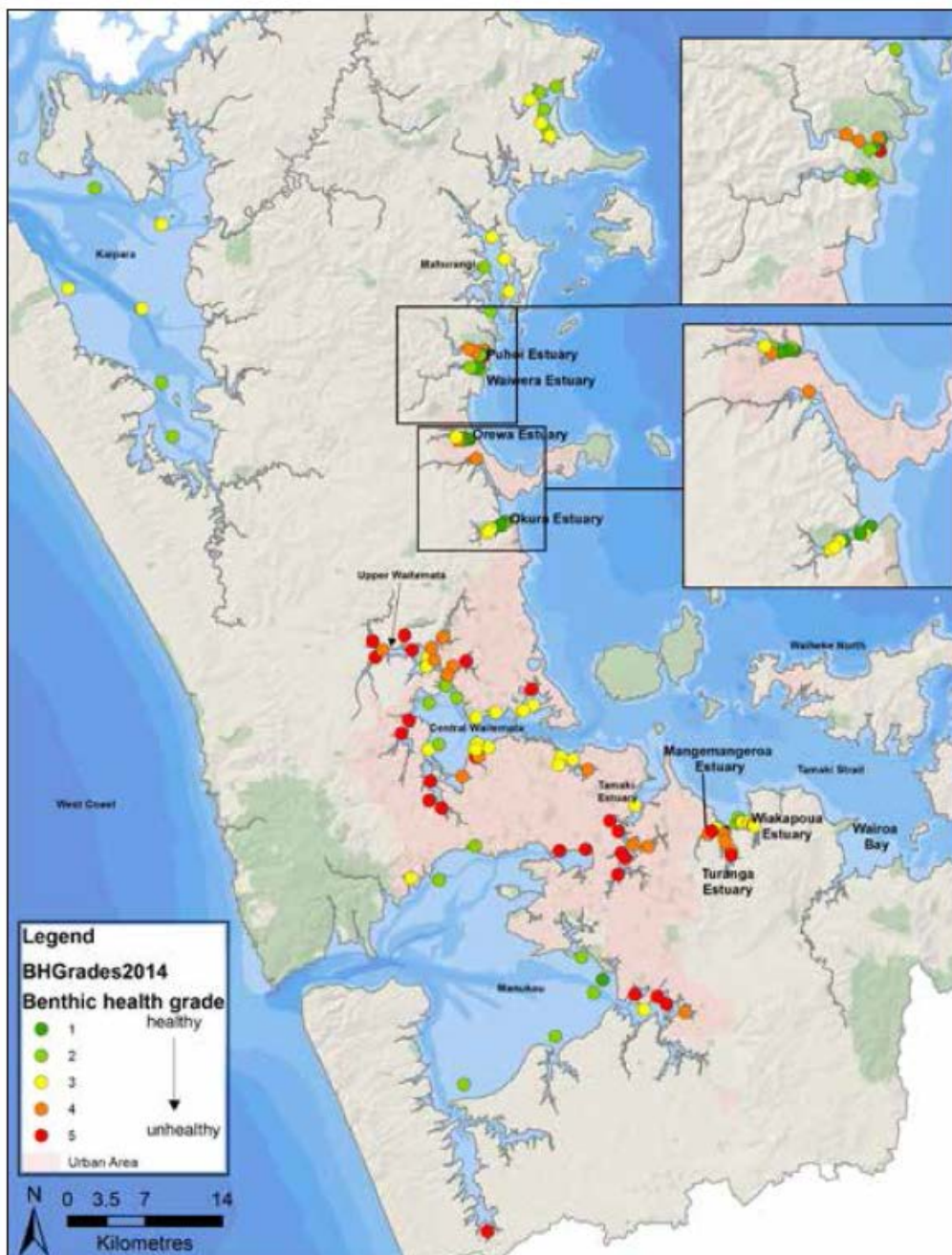
Sediment also has a significant impact on marine receiving environments, resulting in muddy estuaries and harbours. Before extensive human modification of the Auckland region in the mid 1800s, sediment accumulation rates were less than 1mm/year, but have now increased to up to 20mm/year, averaging 3.8mm/year in some east coast locations (Auckland Council, 2015). Increased muddiness in marine environments has several impacts. It impacts on navigability of channels, can encourage mangroves and has significant impacts on the health of benthic species like shellfish and crabs. As muddiness increases, the potential for species to recover decreases. Hewitt and Ellis (2010) found that muddiness proportions of over 25 per cent should be avoided to protect benthic communities. Marine muddiness varies across the region, but is generally higher in more sheltered, low energy environments where there is less tidal and flow movement to disperse the sediments, like the upper Waitematā and Pahurehure Inlet (Figure 12).

Figure 12 Muddiness at sites across the Auckland region as percentage mud (Source: Auckland Council, 2015)



The pattern of muddiness in estuaries also impacts on marine ecology, with generally lower health scores in areas with higher muddiness, like the Waitematā harbour and the Tamaki Estuary (Auckland Council, 2015; Parkes & Lundquist, 2015; Hailes & Carter, 2015; Townsend et al., 2015). The Manukau and Kaipara Harbours generally have good ecological health, where tidal flow is greatest, but some arms are muddy and degraded. In the Waitematā, two sites are now considered too muddy to continue monitoring. The data reported here represent a continuation of the declining trend in the Waitematā, first identified in 1994.

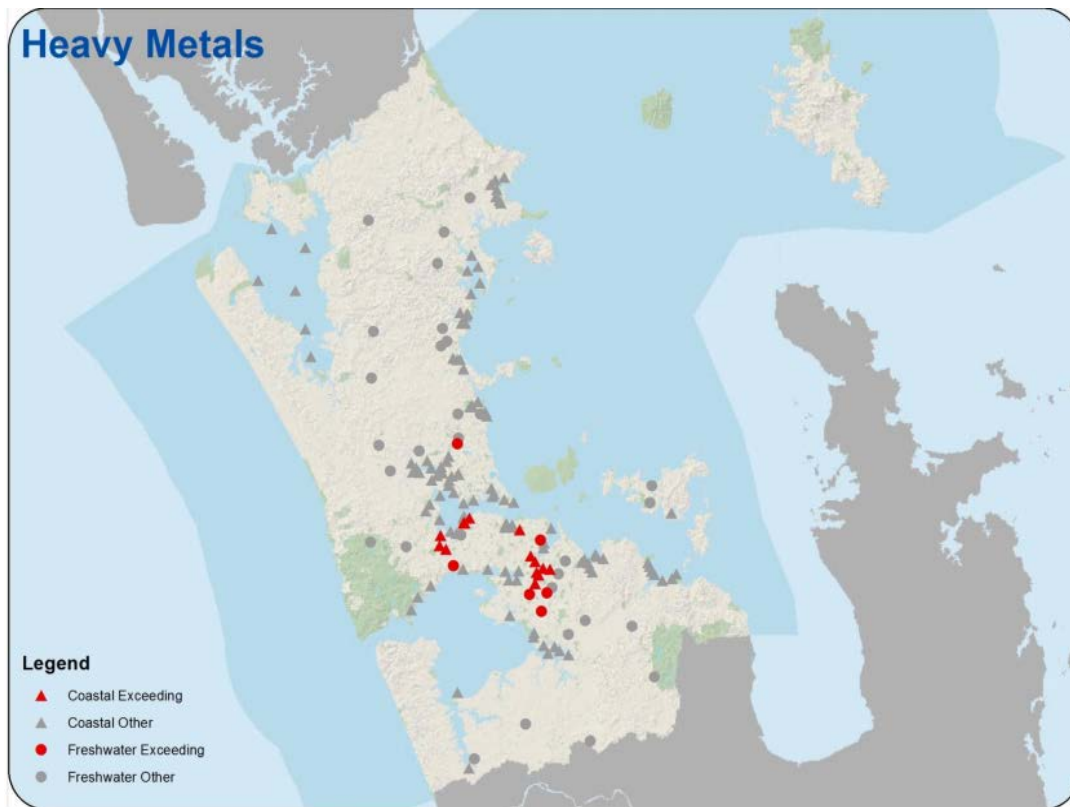
Figure 13 Marine ecology health grades for sites around Auckland based on types of animals in the sediment. Grades are the latest available from 2012-2014 (Source: Auckland Council, 2015).



3.3.6 Water Quality: Heavy Metals

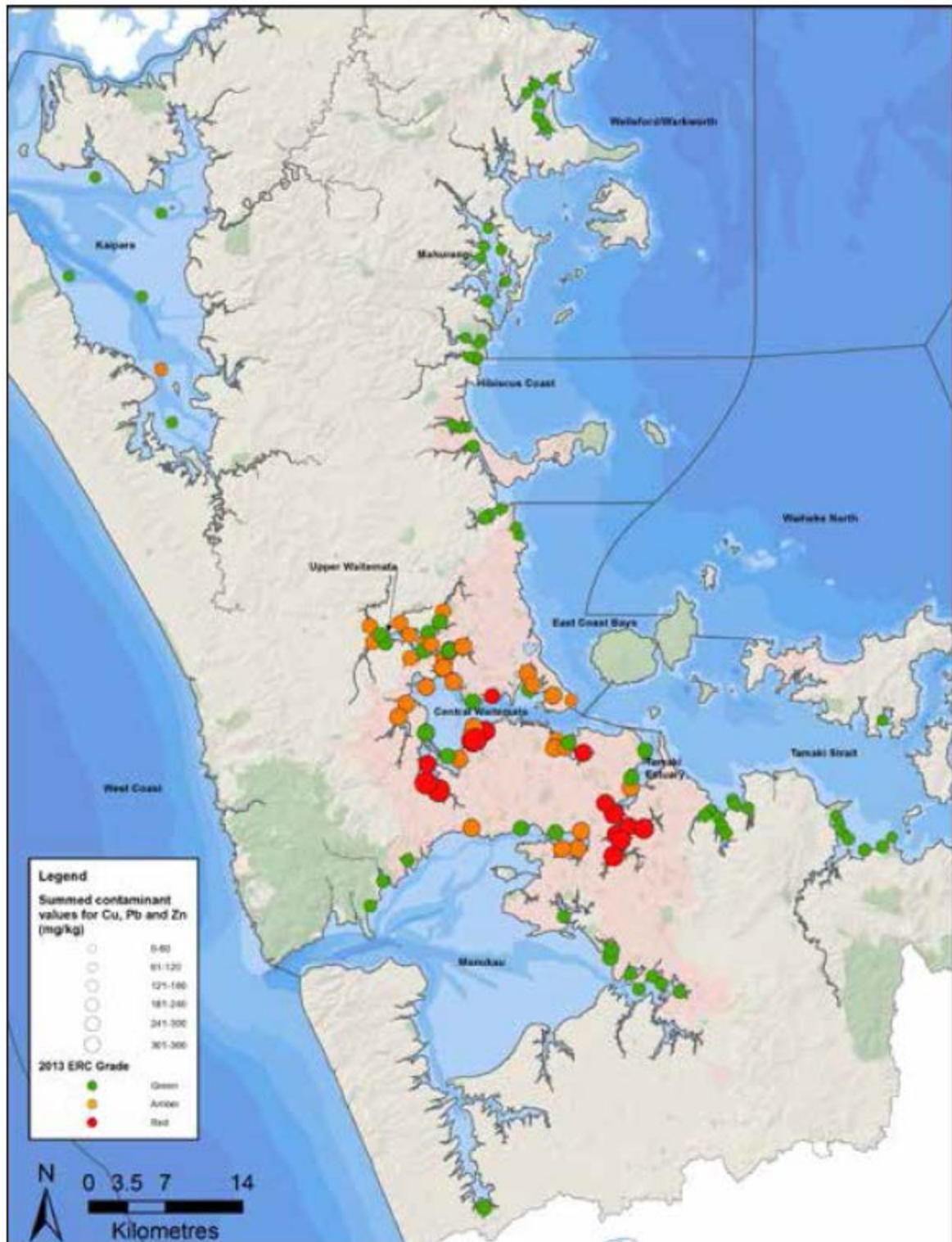
Heavy metals, from run off from roads, building materials, paints and antifouling eventually end up in our environment (Kennedy & Sutherland, 2008). In freshwater environments, like our urban streams, concentrations of heavy metals like zinc and copper can exceed standards (Figure 14).

Figure 14 Current state of heavy metals. River water: median soluble zinc and copper < 80% spp. protection (ANZECC, 2000). Coastal sediment: total zinc > 150mg/kg total copper > 34mg/kg (Source: Auckland Council, 2017b)



The eventual fate of these heavy metals is the marine environment, where they are also exacerbated by additional sources like antifouling paint from boats (Gadd & Cameron, 2012), which in eight Auckland marinas is about double the entire amount predicted to be contributed by stormwater input to the Waitematā harbour. Sampling of 125 sites between 2009 and 2013 showed that 62 per cent of sites had low concentrations, 26 per cent had moderate concentrations and 12 per cent had high concentrations. These concentrations varied across the region as shown in Figure 15.

Figure 15 Site locations and contaminant status of heavy metal concentrations (Source: Auckland Council, 2015)



3.3.7 Water Quality: Lakes

Auckland has around 72 lakes greater than 1ha, from small ponds to flooded valleys forming water supply reservoirs like the Huia and Nihotupu dams (Snelder et al., 2006; Hamil & Lockie, 2015). Water quality is routinely monitored in the five largest lakes, with all lakes showing pressure from human activities due to the variation of land use in their catchments. Over the 20 years between 1993 and 2012, all but one lake showed some improving trends in water quality (as measured by TLI³).

However, data since 2012 shows that Auckland's lakes remain under pressure, with all lakes and some parameters continuing to decline. Lake Pupuke for example, has been plagued by mass algal blooms of increasing severity every year since 2014. A 2017 report (Auckland Council, 2017c) reported decline in all monitored lakes, with some now officially non-vegetated, and showing significant impact from pest fish. While some indicators may present short term positive trends, these are against a background of overall decline.

Auckland's lakes are impacted to varying degrees as a result of anthropogenic pressures. Targeted management strategies are required to maintain and improve these freshwater systems.

3.3.8 Freshwater Issue: Urban Stream Syndrome

Urban stream syndrome (Figure 16) is a term used to describe the degraded state of many urban streams as a result of the number and intensity of pollutants in the urban environment (Auckland Regional Council, 2004; Meyer et al., 2005; Reid et al., 2008; Collier et al., 2009). Generally, the state of these urban streams reflects the pressures on urban streams, from land uses like roads and impervious surfaces, stormwater and wastewater overflows and industrial spills. Urban stream syndrome also has broader effects than just water quality. It impacts the morphology of streams (Reid et al., 2008), which affects the ability of urban streams to cope with storm events, leading to increased flooding and less resilient catchments (Auckland Council, 2013; Walsh et al., 2016). These impacts are further exacerbated by piping and concrete lining of channels, limiting habitat for species and modifying flow.

³ Tropic Level Index integrates four key measures of lake state: total nitrogen, total phosphorus, chlorophyll and Secchi depth (Burns et al., 2000).

Figure 16 An example of a highly modified urban stream (Source: Auckland Council, 2015)



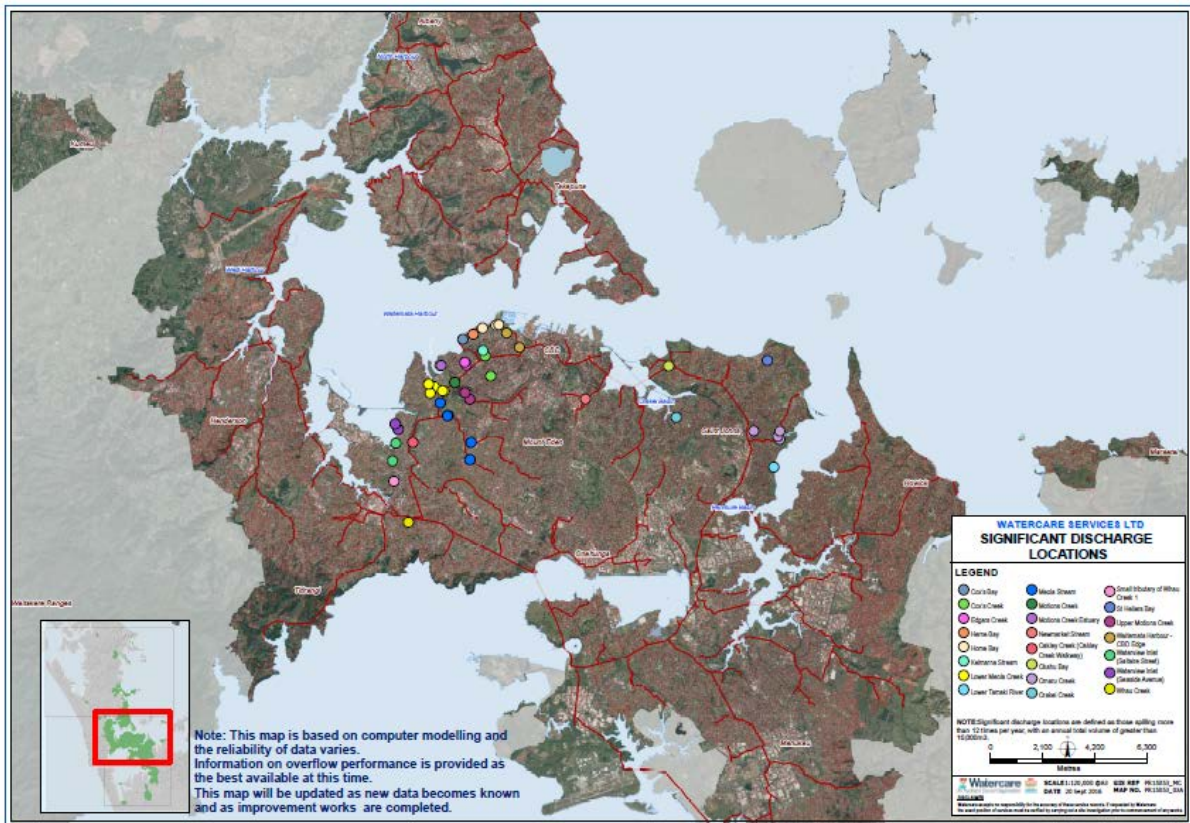
Figure 17 River water quality sites and their water quality class (Source: Auckland Council, 2015)



3.3.9 Water Quality Issue: Waste Water Overflows

Around parts of Auckland, particularly in the inner west suburbs like Grey Lynn and Ponsonby, the wastewater network (stormwater and sewerage) are combined in a single system. This means, that in times of heavy rain, sewerage is discharged directly to the harbour, impacting on water quality and making it unsafe to swim at many of the city's beaches. There are 23 locations where the combined network overflows more than 12 times per year, over 10,000m³ (Figure 18). The frequency and magnitude of these overflows means that there are several beaches across the region that are permanently closed, due to health risk. The Safeswim (www.safeswim.org.nz) tracks the impact of overflows in real time.

Figure 18 Significant discharge locations (Source: Watercare. <https://www.watercare.co.nz/CMSPages/GetAzureFile.aspx?path=-\watercarepublicweb\media\watercare-media-library\wet-weather-overflows\significantwwoverflows.pdf&hash=afd1a2fcdd2d300f48151083bb518f0cbb4a>)



3.4 Air Quality

This section presents the current state of our air quality as well as the major contributors to its current state. As noted previously, the intent of the Environment and Cultural Heritage outcome is to address the root causes of these impacts, such as Auckland's growth and development, our ageing infrastructure as well as the actions and decisions of Aucklanders.

3.4.1 Overview

Auckland generally has good air quality, due to a windy climate which supports dispersion, and no large polluters upwind of the region (Auckland Council, 2015). Anthropogenic activities however, impact on this natural advantage. The major sources of air pollutants in Auckland are transport burning fossil fuels, home heating using solid fuels like wood and coal and industrial emissions (Auckland Council, 2015; Xie et al., 2014).

3.4.2 Auckland Air Quality: Sources

The 2006 air emissions inventory (Xie et al., 2014) estimated total emissions in the Auckland region as :

Table 5 2006 Auckland Air Emissions Inventory (Source: Xie et al., 2014)

Emission	Quantity (t/yr)	Source (%)			
		Transport	Domestic	Industry	Biogenic
PM ₁₀	3,170	38	47	15	-
PM _{2.5}	3,000	39	50	11	-
NO _x	20,800	79	-	16	4
CO	113,000	86	12	2	-
VOC	32,700	22	14	40	24
SO ₂	2,800	52	1	47	-
CO ₂	8,170	42	6	52	-

These emissions vary by season, with higher emissions in winter, particularly of PM₁₀⁴, due to winter emissions from solid fuel burning. PM₁₀ emissions on winter weekdays (18.8t /day) are four times that of a typical summer day. On winter days, burning solid fuels, accounts for 75 per cent of these PM₁₀ emissions, compared to 5 per cent on summer weekdays. Transport sources account for 18 per cent of PM₁₀ emissions on a winter weekday, but increase to 69 per cent of PM₁₀ on a summer weekday (Xie et al., 2014).

⁴ PM refers to suspended particulates in the air, like dust, soot and other particles. PM₁₀ refers to all particulate up to 10 µm in diameter, PM_{2.5} refers to all particulate up to 2.5 µm (<http://www.mfe.govt.nz/more/environmental-reporting/air/air-domain-report-2014/state-new-zealands-air/pm10>)

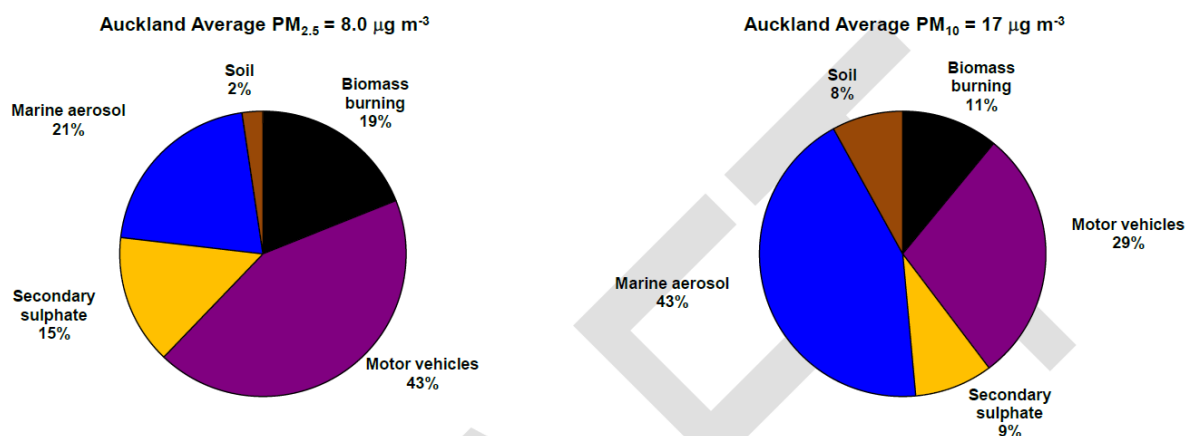
The 2006 emissions inventory also predicted emissions to 2011. A decline in carbon monoxide (CO) emissions to 2011 was predicted, which was replicated in monitoring data, meaning that CO was not reported in the 2015 State of Environment report (Auckland Council, 2015). Nitrogen oxides (NO_x) emissions were predicted to decline, given improvements in vehicle emissions technology, and this prediction was confirmed by monitoring data, particularly at Queen St, which showed around a 40 µg m⁻³ reduction between 2004 and 2014 (Auckland Council, 2015). Similarly, the number of exceedances of the nitrogen dioxide (NO₂) National Environmental Standard for Air Quality declined from several per year between 2003 and 2008 to 1 per year in 2009, 2011 and 2013. No exceedances have been recorded since.

Xie et al (2014) also predicted that PM₁₀ emissions in Auckland would fall, driven by a shift away from solid fuels for home heating and industrial use. A decline in PM₁₀ concentrations was reported by Auckland Council (2015) between 1999 and 2015. Similarly, declining numbers of exceedances of the National Environmental Standard for Air Quality were also reported. The Auckland Urban Airshed⁵ is on track to be reclassified as non-polluted in 2018. However, assessing which individual source(s) have declined to deliver the overall decline is difficult through monitoring concentrations alone.

3.4.3 Air Quality: PM_{2.5} and PM₁₀

Since 2004, Auckland Council has been running a program to assess the relative contributions of sources to overall PM_{2.5} and PM₁₀ concentrations through source apportionment, which allows detailed assessment of the relative contributions of sources (Davy et al., 2016, Davy et al., 2017).

Figure 19 Average source contributions to PM_{2.5} (left) and PM₁₀ (right) across Auckland (Source: Davy et al., 2016; Auckland Council, 2015).



⁵ The Auckland Urban Airshed refers to roughly the urban area of Auckland <https://www.mfe.govt.nz/sites/default/files/media/Air/airshed-progress-report-2012-final.pdf>

Davy et al. (2017) also reported trends in the changes in the proportions of Particulate Matter (PM) concentrations in Auckland, finding that PM_{2.5} and PM₁₀ concentrations had declined at all sites, with some demonstrating more significant trends. Similar findings were reported by Talbot et al. (2017). Up to 70 per cent of the decline in concentration in PM₁₀ is due to decline in PM_{2.5}. Davy et al. (2017) made 5 important observations on particulate matter trends in Auckland:

- Contribution of burning solid fuels for heating to total PM concentrations is increasing.
- PM associated with transport emissions decreased at all sites, with declining PM_{2.5} contributions driving the decline in PM₁₀. The contribution from diesel vehicles was found to have declined the most, but some sites showed an increase in re-suspended road dust, possibly due to increased traffic volumes.
- Secondary sulphate contributions to PM_{2.5} and PM₁₀ concentrations have declined. This was attributed to the introduction of low sulphur fuels.
- Natural sea salt contributions declined through the monitored period.
- A small decline in crustal matter (soil, natural dust) contributions.

Other sources of emissions also contribute to Auckland's overall air quality. Emissions of Volatile Organic Compounds (VOCs), through vehicle emissions and industry affect local air quality (Smith et al, 2009; Reid, 2014) and can have health impacts. Shipping emissions, especially those of SO₂ are present at all monitoring sites across the region, with a stronger signal in the CBD, particularly under north-easterly winds (Talbot & Reid, 2017). Heavy metal traces were also found in the CBD, indicating the shipping emissions source (Longley et al., 2016). A study in the CBD found that concentrations across the CBD varied greatly – between city blocks and even by side of the street (Longley et al., 2014)

3.4.4 Air Quality: Vehicle Emissions

Around 120 premature deaths in Auckland per year are attributable to air pollution from vehicles, with an estimated cost of \$466 million per year (Kuschel et al., 2012a). Vehicles are also the largest contributor to Auckland's greenhouse gas emissions (Auckland Council, 2014; Xie, 2017). Data between 2003 and 2011 (Kuschel et al., 2012b) found that emissions from petrol vehicles declined significantly (Figure 20), largely attributed to improve fuel specifications and better emission control technology (Kuschel et al., 2012b; Reid, 2014; Davy et al., 2017).

Emissions from diesel vehicles measured by Kuschel et al. (2012b), replicated the result reported by Davy et al (2014) in that these emissions had not declined as much as predicted (Figure 21), possibly due to the lower 'real world' performance of Euro emission standards (Ligterink et al., 2013; Kadjik et al., 2015; Miller & Franco, 2016). Despite these gains, since 2009 the rate of emissions reduction has plateaued. This plateau has generally been attributed to more older vehicles remaining in the fleet, which are generally

more polluting, and not being replaced by newer, cleaner (and more fuel efficient vehicles) (Kuschel et al, 2012b; Ministry of Transport, 2016).

Figure 20 Trends of petrol vehicles (Kuschel et al., 2012b). (Source: Auckland Council, 2015)

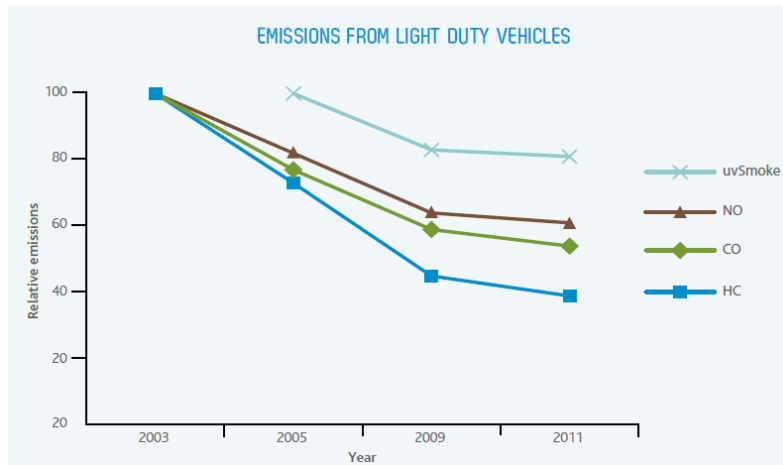
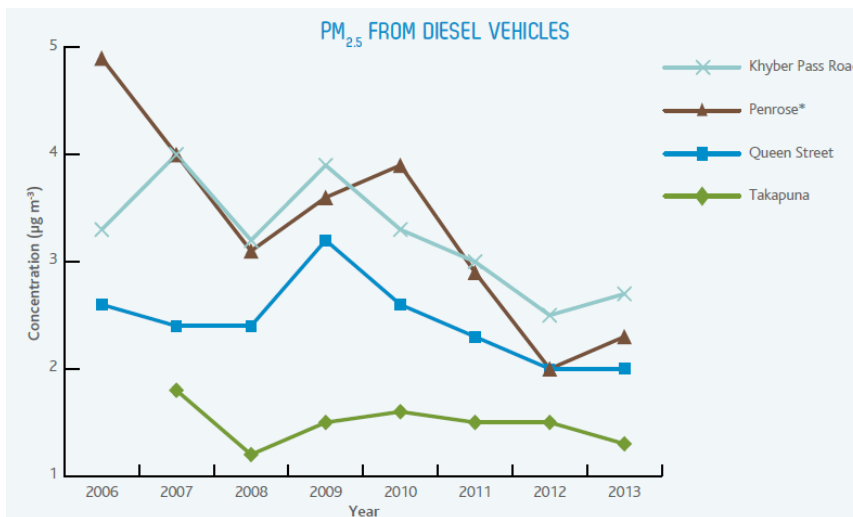


Figure 21 Trend of PM2.5 from diesel vehicles (Davy et al., 2014). (Source: Auckland Council, 2015)



Despite these reductions, vehicle emissions in Auckland fell short of the 2016 reduction targets by approximately 30 per cent (Sridhar et al., 2014; Auckland Council, 2015). It was predicted that PM₁₀ emissions from vehicles in 2016 would total 504 tonnes, and drop to 355 tonnes by 2031, before increasing again in 2041 due to an increase in vehicle numbers and kilometres travelled (Figure 22). NO_x emissions will follow a similar trend, declining through to 2031, before increasing in 2041 (Figure 23).

Figure 22 PM10 emission projections to 2041 (Sridhar et al., 2014)

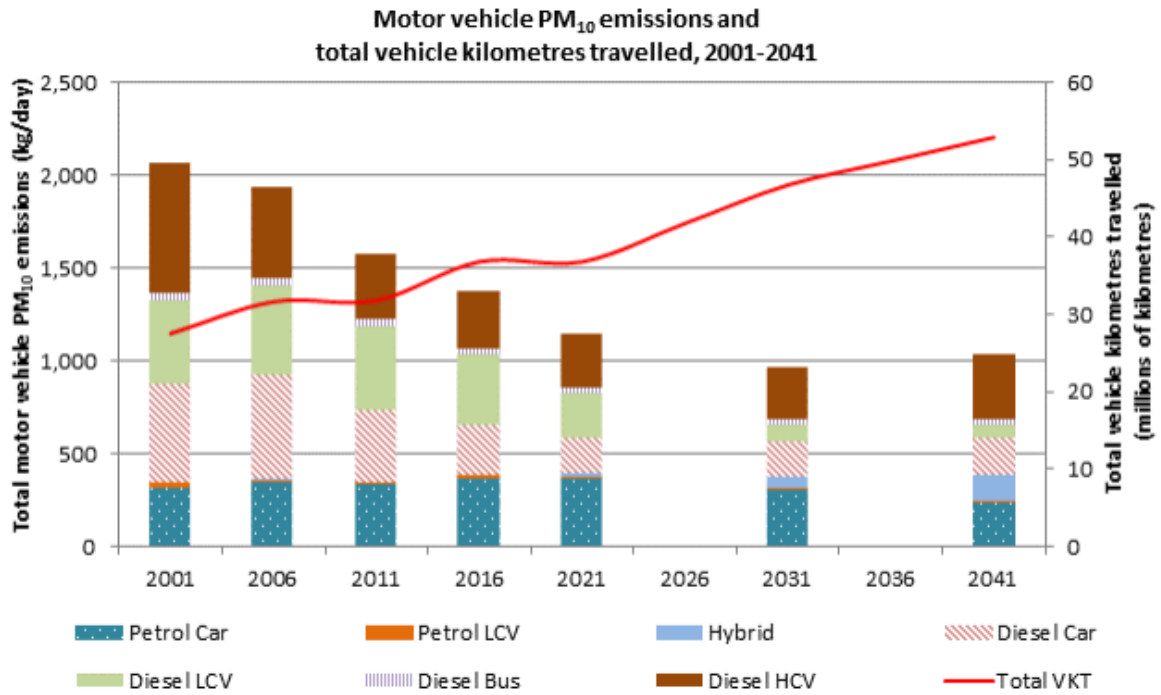
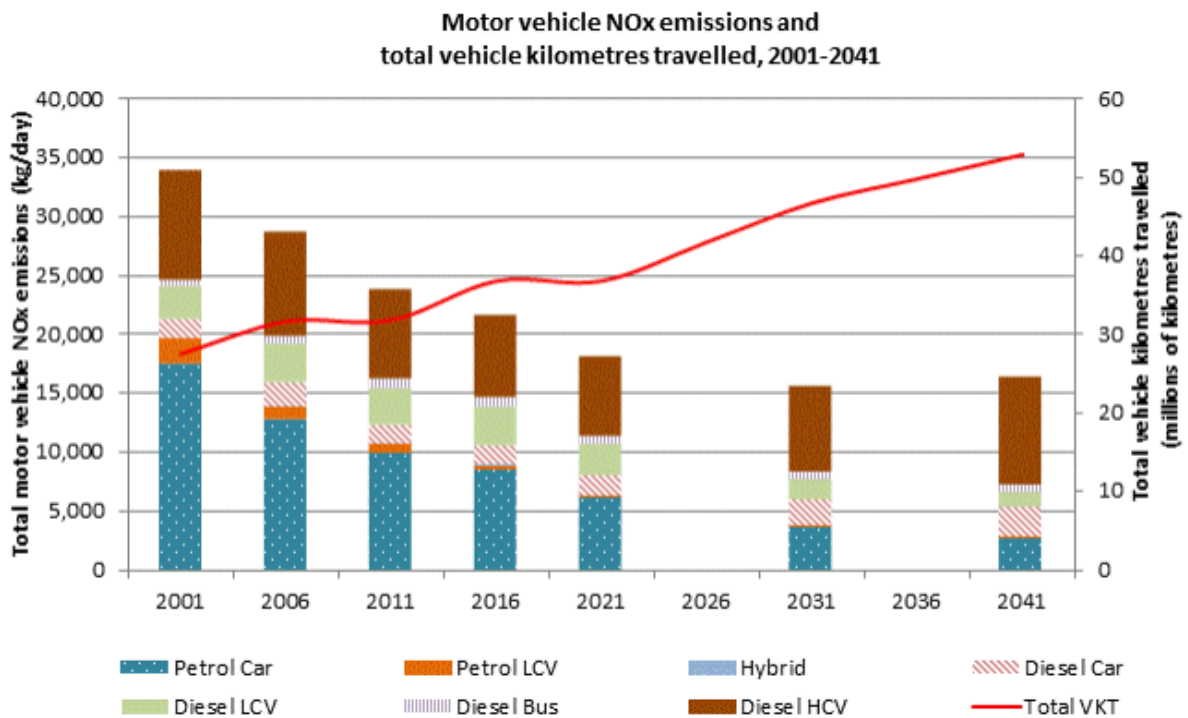


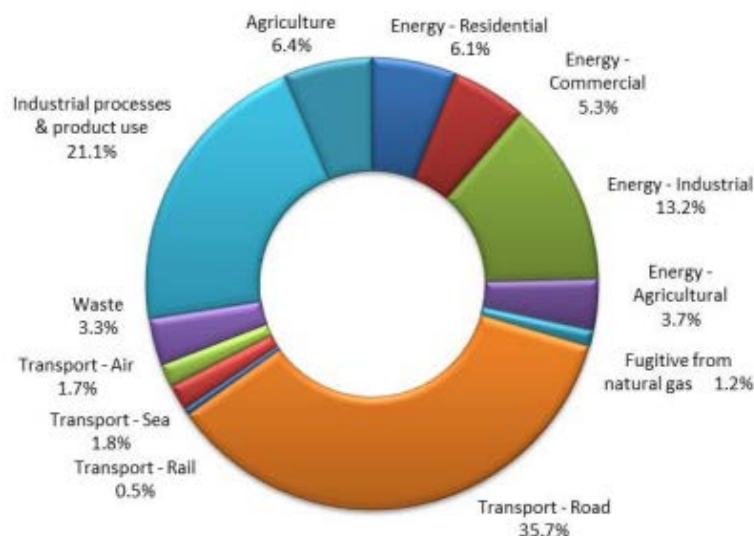
Figure 23 NOx emission projections to 2041 (Sridhar et al., 2014)



3.4.5 Greenhouse Gas Emissions

In 2015, Auckland's gross greenhouse gas emissions were 11,309 kilo-tonnes of carbon dioxide equivalent (kt CO₂e) (10,267 kt with forestry sequestration included) (Xie, 2017). Transport emissions made up 39.7 per cent of total emissions (Figure 24), with 35.7 per cent of this made up of road transport emissions. 2015 saw an increase of 1.5 per cent on net 2014 emissions, and 2.1 per cent on 2009 emissions.

Figure 24 Auckland's greenhouse gas emissions profile in 2015 (Source: Xie, 2017)

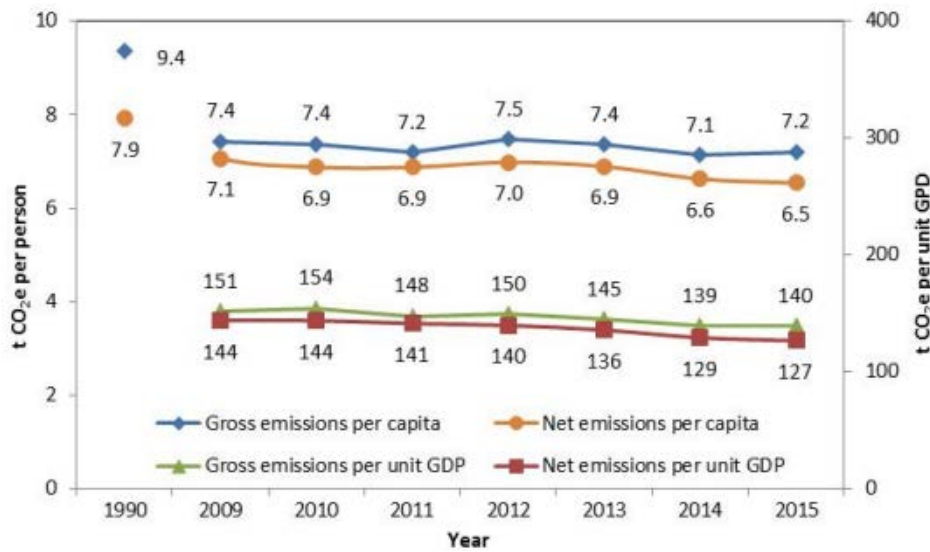


Auckland's greenhouse gas emissions are increasing. In order to meet reduction targets, Auckland will need to reduce emissions by at least 23.7 per cent by 2020. Auckland has set greenhouse gas emissions reduction targets based on 1990 (Xie, 2017) emissions of:

- 10 – 20 per cent by 2020 (23.7% to 32.1% reduction required)
- 40 per cent by 2040 (49.1% reduction required)
- 50 per cent by 2050 (57.6 % reduction required)

However, as Auckland's population and Gross Domestic Product (GDP) have increased, there has not been a proportional increase in greenhouse gas emissions, and thus emissions per capita and per unit GDP have declined (Xie, 2017) (Figure 25).

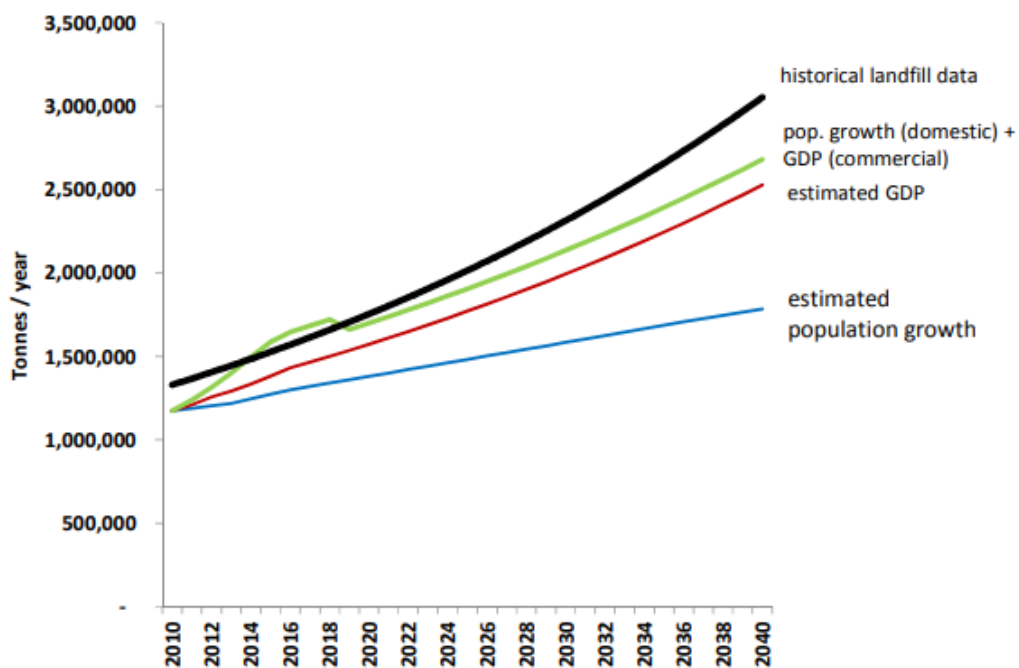
Figure 25 Auckland Greenhouse gas emissions intensity (Source: Xie, 2017)



3.5 Waste

Waste generation represents a significant pressure on the environment. The produce-consume-dispose cycle puts pressure on the environment at all three stages, but the pressure is most pronounced when it comes to disposing of used items, and when there is ‘leakage’ from the system, as litter, which often makes its way into rivers and streams, and ultimately ends up in the marine environment. Waste is a growing issue for Auckland – in 2016, 40 per cent more waste was sent to landfill than in 2010 – and this is forecast to grow with population change (Auckland Council, 2018).

Figure 26 Auckland regional waste to landfill projections (Source: Auckland Council, 2018)



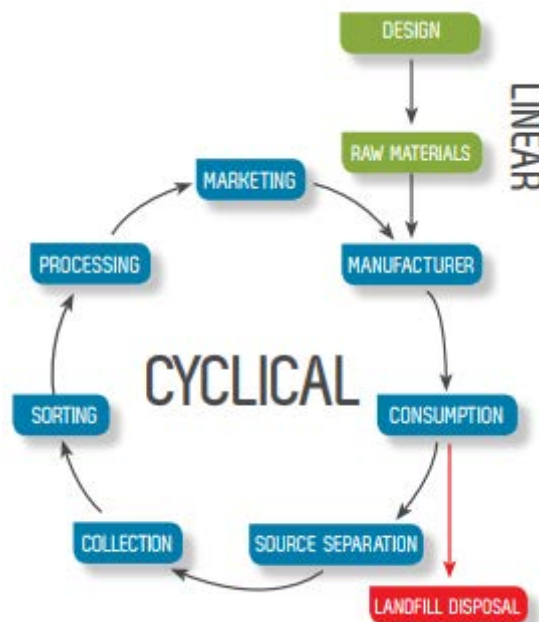
This section discusses a number of key challenges and opportunities associated with Auckland’s waste.

3.5.1 Waste Management and Minimisation

Currently, resource use follows a linear flow (Figure 27), from production to disposal at landfill. A shift to a cyclical resource flow maximises resource use, providing opportunity for multiple re-uses, rather than quickly disposing of a product after its first use. At least 30 per cent of household refuse in Auckland could either be recycled or adaptively reused in this manner.

In 2010, 1.174 million tonnes of waste were sent to landfill in Auckland (1.646 in 2016) (Auckland Council, 2012c; 2018). Approximately 65 per cent of this waste could be recycled, composted or processed differently, rather than being sent to landfill. A typical refuse bin or bag in Auckland is composed of 15 per cent recyclables, 35 per cent refuse, 40 per cent food waste and 10 per cent green waste (Auckland Council, 2012c). There is therefore an opportunity, as outlined in the Waste Management and Minimisation Plan, to significantly reduce the volume of refuse in a typical bin (and therefore what goes to landfill) by managing what can be recycled, composted or processed differently.

Figure 27 Linear and cyclical resource flows (Source: Auckland Council, 2012c)



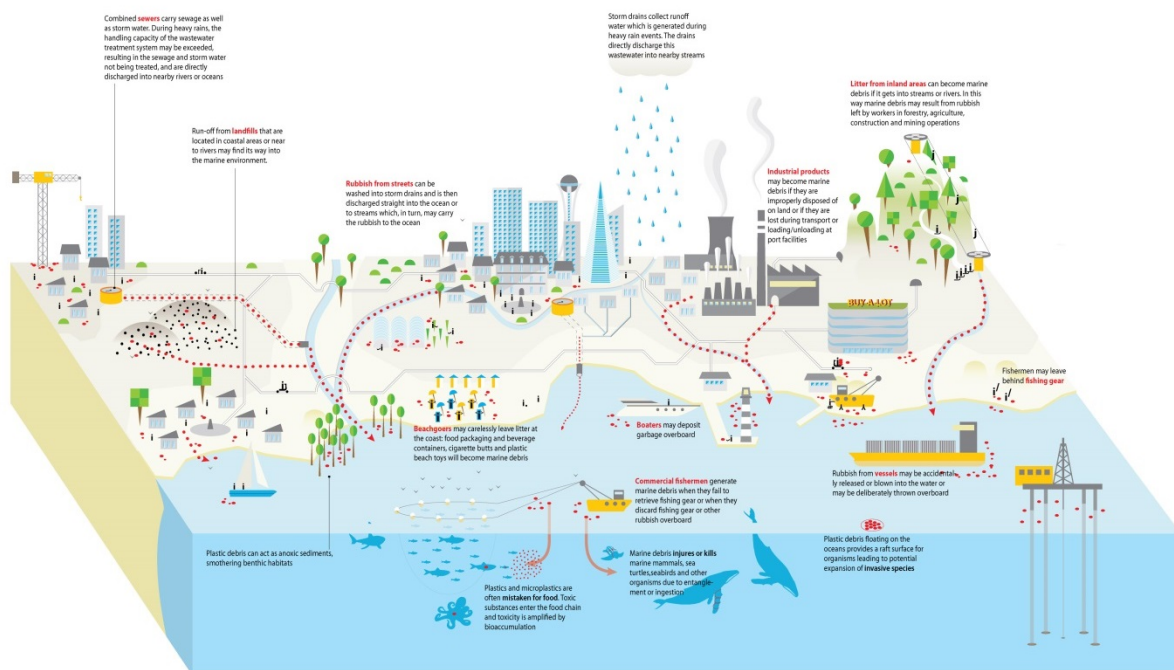
Addressing waste minimisation and management correctly has important benefits, over and above dealing with resource flow from use to disposal. This approach assumes that

there is no loss from the system, that it is a closed loop. However, litter is present in all our environments, especially in marine environments which has detrimental impacts on marine life and higher up the food chain.

3.5.2 Marine Litter

It is estimated that 80 per cent of marine litter comes from land-based sources (Eunomia, 2016), where it can have a range of impacts (Figure 28).

Figure 28 Sources and impacts of marine litter (Source: <https://www.grida.no/resources/6922>)



The most prominent environmental impact of marine litter is its effects on marine life. Marine litter can impact marine life in two ways, through entanglement and digestion. There are no direct studies on the effect of marine litter on the environment in Auckland, however there are a range of studies from the rest of the country and world.

Many floating plastics can look like prey for marine life, for example, plastic bags look like jellyfish and are often accidentally consumed by turtles, whales or fish. Studies by New Zealand researchers have found that there are extremely high densities of plastic litter near seabird burrows in the northern islands of the country, which would suggest that plastic ingestion is a serious problem for New Zealand seabirds (Buxton, 2013). This is important for Auckland region as the Hauraki Gulf is considered a seabird biodiversity hotspot, with 20 per cent of the world's total number of seabird species passing through and 23 species breeding here (Gaskin & Rayner, 2013).

It is common in New Zealand for DOC to respond to reports of distressed marine animals that have become entangled or consumed plastic litter. It is estimated that in New Zealand, approximately 100,000 marine mammals are killed every year from entanglement or digestion from marine litter (Royal Albatross Centre, unknown). As a maritime country, New Zealand has a high number of native marine mammals, fish and reptiles; some of which are either endangered or threatened. A number of these species are evident around the Auckland region, such as the critically threatened Bryde's whales, estimated to have a population of less than 200 (Constantine et al., 2015). Reducing the amount of marine litter would decrease the risk to marine mammals which would ensure that healthy populations of these species remain.

Marine litter along coastlines, rivers, streams and marine environments destroys the aesthetics and health of these areas and therefore impacts on the enjoyment of using them. Maintaining these areas benefits both private and public sectors – for example, private sectors such as the fishing/aquaculture industry and recreational fishing in general, businesses who run recreational activities and hospitality businesses such as restaurants and hotels.

The main benefit in the public sector is through the tourism industry. It is internationally proven that these public and private sectors see economic benefits when the coast and marine environments are pristine, clean, biologically healthy and free of litter as more people are attracted to use these spaces and associated services. Areas which have degraded environments are less likely to attract visitors, with consequent impacts on the tourism economy.

Although it is challenging to quantify the exact value of these impacts, a report published in conjunction between the Australian Government, Asia-Pacific Economic Cooperation and UNEP, estimated that the cost of marine litter on the marine tourism sector in New Zealand, Canada, Australia and USA in 2008 was approximately \$622M USD across all countries (McIlgorm, Campbell & Rule, 2008).

The impact of marine litter on human health can be difficult to measure, however the key concern is around marine litter in the form of microplastics⁶ entering the food chain. Recent concerns have highlighted the growing presence of microplastics in the marine environment, as they are starting to be detected in the stomachs of various organisms and marine animals including zooplankton, invertebrates, fishes, seabirds and whales (UNEP, 2016). This poses the threat that when humans consume seafood, they are also consuming microplastics, or the toxins associated with them.

⁶ The term 'microplastics' is widely used to describe plastic particles with the size ranging from 1 nanometre to 5 millimetre

A recent study of fish sampled from seafood markets in California and Indonesia found that one quarter of the fish had plastic fibres in their guts (Rochman et al., 2015). Another study in the North Sea tested 1,200 individual fishes for plastic ingestion including species such as herring, grey gurnard, whiting, horse mackerel, haddock, Atlantic mackerel and cod. Of these, five of the seven species tested positive for plastic ingestion – all having at least one particle of plastic present in their guts or flesh (Foekema et al., 2013). In bivalves, any microplastics consumed by the organism are in turn consumed by the person eating it due to usual consumption of the whole flesh. A bivalve study conducted by scientists at Ghent University in Belgium looking at quantity of microplastics in bivalves, concluded that the average seafood eater in Europe is probably consuming up to 11,000 microplastics per year (Van Cauwenberghe & Janssen, 2014).

In the past year, there have been a number of positive announcements from the public and private sectors which will assist with reducing plastics in the environment in general and the marine environment in particular.

In October 2017 both Countdown and New World supermarkets announced their intention to go plastic bag free by the end of 2018 and both Countdown and Foodstuffs, which includes the New World, Pak 'n' Save and Four Squares supermarket chains, committed to reduce plastic packaging in general in its stores over the next 18 months. In December 2017, Environment Minister, David Parker said he was confident the government would be able to find a plastic bag policy which pleased all coalition partners and announced that the job of tackling plastic bag use and writing up legislation will be delegated to Association Environment Minister Eugenie Sage. In early June 2018, Minister Sage indicated that her preference was to phase out single-use plastic bags rather than introduce a levy. A decision is likely before the end of 2018.

In December 2017 the New Zealand Government announced that it had finalised regulations to ban the sale and manufacture of certain types of products containing plastic microbeads. The regulations, which will come into effect in early June 2018, prohibit, under section 23 of the Waste Minimisation Act 2008, the sale and manufacture of wash-off products that contain plastic microbeads for the purposes of exfoliation, cleaning, abrasive cleaning or visual appearance of the product. The reason for the ban, is explicitly stated by MfE to prevent plastic microbeads, which are non-biodegradable, entering our marine environment, in recognition of the fact that they can harm both marine life and life higher on the food chain including humans.

4 Stakeholder Feedback

There has been a range of engagement activity with partners and stakeholders throughout the development of the Auckland Plan 2050. Targeted engagement on the Environment and Cultural heritage outcome was undertaken in two main phases.

The first round of engagement took place between May and June 2017. This engagement sought feedback on the proposed working model for the development of the Auckland Plan 2050. Within this proposed working model the issues that were eventually drawn into the Environment and Cultural Heritage outcome centred on the 'Protect and Enhance' theme. The feedback received on this theme is outlined in Table 6 First Round Engagement Feedback (May to June 2017) below.

The second round of engagement took place between July and October 2017. This engagement sought feedback on the proposed outcome strategic framework and the high-level areas of the Development Strategy. Engagement material included a proposed set of strategic directions and focus areas for each of the six outcome areas together with summary information. The feedback received is outlined in Table 7 Second Round Engagement Feedback (July to October 2017) below.

Table 6 First Round Engagement Feedback (May to June 2017)

Summary of Feedback
<ul style="list-style-type: none"> There was feedback about the importance of recognising the value of natural and cultural heritage and its importance for liveability of the city and individual well-being.
<ul style="list-style-type: none"> People stated that there is a need to acknowledge the current state of the natural environment and cultural heritage, and that effective action is required just to "catch-up" to an acceptable level.
<ul style="list-style-type: none"> There were comments that Māori values and kaitiakitanga (environmental guardianship, stewardship and protection) need to be reflected in environmental management and cultural heritage protection.
<ul style="list-style-type: none"> Minimising the impact of growth was considered important, particularly being aware of not losing valuable green assets to urban sprawl and understanding the impact of urbanisation on the natural environment and cultural heritage. There was specific concern around water quality (freshwater and marine) and a query whether a separate section is required on this.
<ul style="list-style-type: none"> Some feedback raised questions about whether the Unitary Plan provides adequate protection and regulatory levers for historic heritage.
<ul style="list-style-type: none"> There was feedback about how to support growth to get the best outcomes. For example, ensuring the types of infrastructure and services required to enable growth are considered.

Table 7 Second Round Engagement Feedback (July to October 2017)

Summary of Feedback	
Water	<ul style="list-style-type: none"> • Need to address the water quality of our waterways, including our harbours/marine environments as significant places. • Water supply, availability and resilience of future supply. • Infrastructure – issues with ageing infrastructure and opportunity provided by green infrastructure.
Climate change	<ul style="list-style-type: none"> • Need prominent acknowledgement of the impacts of climate change, including the physical and social impacts and threats. • Coastal erosion is a regional priority.
Significant environments (Positive)	<ul style="list-style-type: none"> • A number of areas were specifically identified as having significance to stakeholders, such as the Waitakere Ranges, Hunua Ranges, Manukau Harbour, Hauraki Gulf and Islands. Various 'classifications' of sites/features were also identified, such as ecological corridors (e.g. the North West Wildlink), cultural heritage sites and volcanic features.
Sustainability	<ul style="list-style-type: none"> • Activities related to more sustainable behaviours/practices were highlighted, such as the construction of more sustainable homes and buildings, the promotion/enabling of waste minimisation/recycling and broader low carbon initiatives. • The importance of addressing the needs of future generations within the Plan was noted.
Stewardship	<ul style="list-style-type: none"> • The importance of enabling our community to take a proactive role in the management of the environment was noted. • Strong support from volunteers with long term commitments to caring for our environment, particularly around waterways, was noted. • The need to broaden this interest and involvement of all Aucklanders was also stressed, including in decision making.
Measures/monitoring	<ul style="list-style-type: none"> • Various aspects relating to the measurement and monitoring of this outcome was noted, including: the need for baselines; the continuation of historic monitoring; the need for measurable goals, indicators and interim goals; and the need for generational, long-term goals.
Integrated Environment and Cultural Heritage approach	<ul style="list-style-type: none"> • Diversity of feedback with some supportive of the approach and some suggesting a separation of the two concepts. • General themes in the feedback were: • An integrated approach diminishes the importance of the environment.

Summary of Feedback

- Environmental matters should be evaluated against intrinsic ecological factors, not people-centric ones. These intrinsic values should also be primary, with social/economic benefits secondary.
 - There is an intrinsic link between environment and people that needs to be recognised within the plan. Humans are hard-wired to need connections to the natural world.
 - It is notable that the connection between environment and people was recognised even where a split of the two themes is suggested.
-
- Other issues raised
 - The cross-boundary nature of the environment and environmental impacts is such that legislative/administrative boundaries are not recognised.
 - Numerous specific impacts on Auckland's environment were noted, such as run-off from roads, biodiversity loss, pest/weed control, air and water pollution and waste management.

The feedback received through the engagement was used to refine both the specific directions and focus areas of this outcome area, as well as the overall narrative for the outcome and the broader Plan. This included:

- The addition of further context and clarity on the integrated approach for the outcome within the outcome narrative.
- The addition of a focus area specifically relating to water (Focus Area 6: Adapt to a changing water future).
- Further information provided on the direction and focus area relating to resilient infrastructure (Direction 4: Ensure Auckland's infrastructure is future-proofed) and green infrastructure (Focus Area 5: Use green infrastructure to deliver greater resilience, long-term cost savings and quality environmental outcomes). This included the development of supporting information regarding green infrastructure.
- Greater emphasis provided on the significant environments and cultural heritage identified by stakeholders through the outcome narrative and specifically within Focus Area 4: Protect Auckland's significant environments and cultural heritage from further loss.
- Further reinforcement of the behavioural component of environment and heritage protection, including strengthening of the importance of broader stewardship through Focus Area 1: Encourage all Aucklanders to be stewards of the environment, and to make sustainable choices.
- Additional linkages to sustainability and climate change provided within the outcome narrative, including the development of supporting information on climate change.

5 Public Consultation

Auckland Council’s Planning Committee approved the draft Auckland Plan 2050 for consultation in November 2017. Formal consultation on the draft plan took place from 28 February to 28 March 2018, alongside the draft 10-year Budget. The material to support consultation was available online and in libraries, service centres and local board offices. It included a combined Auckland Plan 2050 and 10-year Budget consultation document, the draft Auckland Plan website (the digital plan), an overview document with translations, and full print versions of the whole draft plan. Feedback was provided in writing (including via an online feedback form), in person (over 50 Have Your Say events) and via social media.

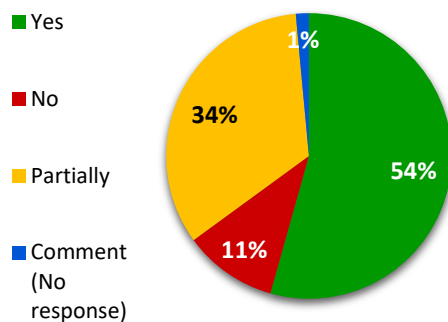
The consultation document contained the following statement and question on the Environment and Cultural Heritage outcome:

Unprecedented growth has required Auckland to provide for essential development, which has had an impact on our environment and cultural heritage. The Auckland Plan proposes utilising every opportunity to protect and enhance Auckland's environment as growth and development happens.

Do you think the six focus areas identified in Environment and Cultural Heritage will achieve this?

There were 14,949 written submissions on the Environment and Cultural Heritage outcome. Of these, 54 per cent agreed with the focus areas, 34 per cent partially agreed, 11 per cent did not agree, and 1 per cent provided commentary but did not tick one of the yes/no/partial boxes.

WRITTEN SUBMISSIONS
14,949 responses



In addition to the written submissions, there were 470 feedback points from 'Have Your Say' events:

Yes	40%
No	10%
Partial	9%

Provided comment but did not indicate yes, no or partial	41%
--	-----

5.1 Summary of Public feedback received

Of the approximately 15,000 submissions received, around 30 per cent provided specific comment/feedback on the outcome. A number of regional stakeholders included discussion of the Environment and Cultural Heritage outcome within their submissions. The remainder provided no comment other than indicating 'yes/no/partial' in response to the consultation question. Three broad themes were evident within the 4,000 or so comments received from individual and regional stakeholder submissions:

1. *Implementation and delivery of the Environment and Cultural Heritage Outcome, including comments relating to:*

- How the outcome will be achieved; further detail on specific programmes and actions to support the focus areas and directions
- More specific and aspirational targets
- How the actions would be funded

2. *Specific topics of interest, including:*

- Waste, including plastics, recycling and litter
- Water, including the marine environment and harbours
- Climate change
- Trees and green space
- Heritage
- Green Infrastructure/Green technology
- Tūpuna Maunga

3. *Challenges and opportunities in delivering the outcome*

- The role of education in delivering the outcomes sought
- Acknowledgement that environmental protection needs to be the responsibility of all Aucklanders
- Concerns that environmental pressures will continue if Auckland's population continues to rise
- Questions as to whether this is council's core responsibility
- A lack of confidence that Council will be able to deliver this outcome as it has not proved it can do this previously

5.2 Assessment of implementation and delivery feedback

This section explains how the feedback received from all sources was used to refine the Environment and Cultural Heritage outcome. As previously covered in this section, the majority of respondents supported the Environment and Cultural Heritage outcome.

The section details the three broad themes of submissions, and responses to these.

1. Implementation and delivery of the Environment and Cultural Heritage Outcome: How the outcome will be achieved:

The most significant of the overall feedback comments received centred on the implementation and delivery of the Environment and Cultural Heritage Outcome. Additional clarity was requested by a large number of these respondents on the specific actions and activities that will be employed to deliver on the outcome. The streamlined nature of the plan is such that this level of detail is not provided within the plan. This detail is provided at the next level (linked to but outside of the Auckland Plan) through a range of other strategic and regulatory documents.

2. Implementation and delivery of the Environment and Cultural Heritage Outcome: Targets and measures

In addition to greater specificity in actions, some submissions asked for more specific aspirational targets to be included within the outcome, like zero emissions or banning plastic bags. Similar feedback was received across the plan, and a small number of targets, which support the current monitoring framework, will be developed.

3. Implementation and delivery of the Environment and Cultural Heritage Outcome: Funding

With regard to feedback received relating to the funding of actions and the willingness of Aucklanders to support additional funding in this area, these considerations would form part of more detailed implementation, delivery and funding plans that would sit beneath the Auckland Plan. The parallel 10-year Budget consultation has shown that a majority of Aucklanders are prepared to pay to accelerate required works to protect the environment (water targeted rate) and to deal with emerging threats like Kauri Dieback and marine biosecurity (natural environment targeted rate).

5.3 Assessment of specific areas of interest feedback

A number of the topics of interest raised within the submissions are already addressed in some form within the outcome and/or broader Auckland Plan 2050:

- Water for example is well addressed within *Focus Area 5: Adapt to a Changing Water Future*;
- Green infrastructure is the subject of *Focus Area 6: Use green infrastructure to deliver greater resilience, long-term cost savings and quality environmental outcomes*; and
- The opportunities of green technology is profiled in *Focus Area 1: Encourage all Aucklanders to be stewards of the environment, and to make sustainable choices*.

1. Specific Topics of Interest: Waste management

Many submissions focussed on both Council and other agencies' responses to managing and minimising waste. Specific topics raised within these submissions included calls to ban the use of single use plastics, concerns regarding Council's approach to inorganic rubbish collection, and illegal dumping. Some submissions expressed concern over changes to Council's refuse collection processes and felt paying to dispose of rubbish was inappropriate. Many of these submissions overlapped the Waste Management and Minimisation plan, which was also out for consultation at the same time.

Response: The majority of these submissions are best dealt with by plans and strategies which implement the Auckland Plan 2050. Some specific changes were made:

- **Environment and Cultural Heritage Focus Area 1:** supporting people to make better choices about which products they buy, and how they dispose of these once used.

2. Specific Topics of Interest: Water Quality and Quantity, including marine and harbours

A large number of submissions were also concerned about water quality issues, particularly around beaches and suitability for swimming, health of urban streams, and the pressure that growth was putting on these aspects. Many of these submissions expressed a desire to have more swimmable beaches and to better protect our marine environments. Some submissions mentioned specific environments which they felt had been missed or neglected, and some also highlighted the work of specific community groups to improve the aquatic environment.

Response: The majority of these submissions are covered by the Environment and Cultural Heritage outcome, and its supporting information. Some specific changes were made:

- **Environment and Cultural Heritage Supporting Information:** marine environments was refined to include specific contaminants, and discuss the inherent values, and connectivity to land
- **Environment and Cultural Heritage Focus Area 5:** specific contaminants and water quality issues mentioned
- **Environment and Cultural Heritage Introduction:** specific mention of priority contaminants like heavy metals and sediment.

3. Specific Topics of Interest: Climate Change

Many of the comments received expressed concern that climate change was not given sufficient prominence within the outcome, despite it being a significant global challenge. A large number of these comments expressed a desire to see specific climate change and adaptation targets included in the plan.

Response: Climate change is well-covered by the plan and is woven through a number of areas, and is supported by a detailed supporting information section as part of Environment and Cultural Heritage. Some specific changes were made:

- **Environment and Cultural Heritage Direction 4** noting long-term infrastructure resilience to climate change impacts

- **Environment and Cultural Heritage Focus Area 1** noting the importance of stewardship under increasing pressure from climate change
- **Environment and Cultural Heritage Focus Area 6** noting how green infrastructure can support climate change adaptation
- **The Environmental Risks and Opportunities map** was edited to better reflect sea-level rise.

4. Specific Topics of Interest: Trees and Green Space

Many of the submissions directly identified challenges relating to Auckland's trees. These comments ranged from concerns over weak tree protection rules through to the management of risks such as Kauri die-back and Myrtle Rust. A related theme observed within the feedback comments related to the preservation of green space within the region. These comments ranged in focus from Auckland's park and recreation facilities through to Auckland's rural areas, but generally expressed concerns over the loss of these assets in the face of Auckland's growth.

Response: Trees, green space and open space is well-covered by the plan and is woven through a number of areas. Some specific changes were made:

- Inclusion of Kauri Dieback in introduction section to Environment and Cultural Heritage
- Addition of Kauri Dieback and other biosecurity threats to environmental risks map.

5. Specific Topics of Interest: How will these actions be funded?

Submissions (across all response categories) raised questions around the funding of actions within the Environment and Heritage Outcome. There were concerns that the outcome's direction would cause increases in council spending, which would be passed on to ratepayers in the form of rates increases, additional targeted rates or other spending. Some felt that no increase in spending was appropriate, while others supported the outcome direction, but were unsure if it meant that it would cost ratepayers more. A number of submissions called for increased funding and resource to deliver the Environment and Cultural Heritage outcome.

Response: The Auckland Plan does not attempt to cover sources of funding. This is delivered through implementation plans and strategies. Despite some submissions expressing concern around funding, 2018-2028 Budget proposals for additional targeted rates (natural environment and water) were positively received during the consultation period.

6. Specific Topics of Interest: Environmental education

Education on environmental issues was raised within a number of feedback comments. Broadly these comments addressed education in two distinct ways. The majority of environmental education related submissions focussed on the opportunity to do more to educate the public in ways to care for and protect the environment. Peoples' attitudes towards litter was one issue raised within a large proportion of these comments that could be addressed through better education of both impacts and expectations. Some submitters raised the issue of population growth, noting the diverse attitudes to the environment that this brings, and how to recognise these differences.

Response: Many of specific topics of interest raised within feedback comments relate to short term actions discussed and programmes proposed through the 10-year budget. However, many of these specific topics of interests are consistent with the overarching aspirations and objectives of the Environment and Cultural Heritage Outcome.

7. Specific Topics of Interest: Heritage

A small number of submissions discussed the role of heritage within the Environment and Cultural Heritage outcome. These submissions covered a number of themes ranging from the lack of reference to built heritage protection, through to recognition of Auckland's broad cultural heritage (not limited to built heritage) as an important part of Auckland's identity that should be preserved. Around 300 submissions specifically related to this topic, out of a total of nearly 15,000. Many of these submissions were not in support of additional protection of heritage.

The importance of Māori heritage was expressed in many of the heritage-related submissions, although there were also a number of submissions that emphasised the focus should not just be limited to Māori heritage.

A number of the heritage-related submissions stated that heritage should not limit the construction of critical infrastructure, or obstruct Auckland's growth and intensification. Some feedback expressed concern that the outcome provided too much focus on heritage and should be limited to the natural environment only. There was however support for the broader definition of cultural heritage provided within the Environment and Cultural Heritage outcome.

Some heritage-related submissions mentioned the need for more heritage protection, through rules, overlays and zones. These functions are provided in the Auckland Unitary Plan.

Response: Heritage is well covered in the plan, by Environment and Cultural Heritage (including the maps), Homes and Places and Belonging and Participation. Some specific changes were made:

- Retain the current broad definition of 'cultural heritage' within **Environment and Cultural Heritage** outcome.
- Maintain broad cultural heritage discussion **within Environment and Cultural Heritage**, but provide clarity on 'natural environment' rather than 'built environment' focus.
- Provide additional focus on built heritage within **Homes and Places Outcome**.
- Provide further context on importance of cultural heritage within **Belonging and Participation Outcome**.
- **Environment and Cultural Heritage Outcome:** Where the term 'environment' appears in the outcome, be explicit on when the outcome is referring to the 'natural environment' or environments more broadly, including within Direction and Focus Area titles,
- **Environment and Cultural Heritage Direction 1** edited to better reflect and incorporate the cultural heritage component of the outcome

- A searchable 'index' pdf document which supports the heritage map, to aid its interpretation
- Inclusion of Heritage in **Homes and Places** as a contributor to quality urban spaces
- Inclusion of Heritage in **Belonging and Participation Quality of life Focus area** to recognise the contribution Heritage makes to people's lives and connection to places.

8. Specific Topics of Interest: Environmental pressure and population growth

A number of submissions (across all response categories, especially Do Not Agree) raised concern about Auckland's growing population, and the pressure that this was putting on our environment. Several suggestions were made about ways to manage this, including sharing growth with other regions, or limiting population growth through a range of controls. Links between population growth, housing and the environment and the cumulative impact of these pressures were also raised.

Response: Population growth undoubtedly puts pressure on the natural environment. Managing the impacts of this pressure through new approaches is the key aim on the Environment and Cultural Heritage outcome. Suggestions for population control methods are out of scope. To support better stewardship and education outcomes, some specific changes were made:

- **Environment and Cultural Heritage Focus area 1** the growing importance of environmental protection with a growing population
- **Environment and Cultural Heritage Focus area 2** how historic impacts continue to affect the natural environment
- **Environment and Cultural Heritage Focus area 3** the need to balance future growth with environmental protection.
- Added Auckland Farm Land Use Classification to the **Environmental Assets map**.

9. Specific Topics of Interest: Tūpuna Maunga

Feedback was received relating to the cultural importance of the Tūpuna Maunga and the need to protect and enhance the Tūpuna Maunga and other volcanic cones. The need to use correct terminology when referring to the Tūpuna Maunga and other volcanic cones was also expressed.

Response:

- Corrected use of Tūpuna Maunga where required
- Added environmental pressure on Tūpuna Maunga

10. Specific Topics of Interest: Responsibilities of Council

Many submissions that responded 'no' to the consultation question did not feel that the activities outlined within the outcome were Council's responsibility. Many of these responses stated that Council had no statutory responsibility toward the environment and thought that these activities should be left to central government agencies such as the Department of Conservation. Some were also concerned that the behavioural focus of the

outcome was attempting to influence people's decisions, and that this was best left to central government, or should not be done at all.

Response: Auckland Council has a clear environmental management, protection and enhancement role under the Resource Management Act (1991) and also has responsibilities under other legislation like the Reserves Act (1977) and Biosecurity Act (1993). Preparation of a spatial plan which integrates environmental, social and cultural matters, whilst providing for growth, is required under the Local Government (Auckland Council) Act (2009).

11. Specific Topics of Interest: Hasn't worked in the past

Some responses expressed concern that the approach outlined in the proposed Outcome was effectively the same as the Council's past and current approach to managing the environment. In these submissions, the continued degradation of the natural environment was seen as the Council's failure to deliver what it said it would in the past, and that therefore nothing would change with the proposed outcome.

Response: It is fair to say that there has been significant environmental degradation in the past (as detailed by this report). A new approach, as outlined by Environment and Cultural Heritage is required to reverse this degradation. A traditional Protect and Enhance approach must be augmented by the directions and focus areas proposed by Environment and Cultural Heritage.

6 Conclusion

6.1 How the strategic framework responds to the evidence and feedback

This section explains how the evidence and feedback provided earlier in this report have shaped the Environment and Cultural Heritage Strategic Framework. The framework comprises directions that identify how the Auckland Plan will achieve the Environment and Cultural Heritage outcome, and focus areas that identify how this will be done.

Table 8 Environment and Cultural Heritage Strategic Framework

Environment and Cultural Heritage Strategic Framework	
Direction	Focus Area
Direction 1 Ensure Auckland's natural environment and cultural heritage are valued and cared for	Focus Area 1 Encourage all Aucklanders to be stewards of the natural environment, and to make sustainable choices
Direction 2 Apply a Māori world view to treasure and protect our natural environment (taonga tuku iho)	Focus Area 2 Focus on restoring environments as Auckland grows
Direction 3 Use growth and development to protect and enhance Auckland's natural environment	Focus Area 3 Account fully for the past and future impacts of growth
Direction 4 Ensure Auckland's infrastructure is future-proofed	Focus Area 4 Protect Auckland's significant natural environments and cultural heritage from further loss
	Focus Area 5 Adapt to a changing water future
	Focus Area 6 Use green infrastructure to deliver greater resilience, long-term cost savings and quality environmental outcomes

Direction 1

Ensure Auckland's natural environment and cultural heritage are valued and cared for

Despite Auckland's past efforts to protect and enhance the natural environment, the pace and manner in which the region has grown and used its resources has outpaced these efforts, meaning the natural environment is significantly stressed and degraded, particularly in marine and freshwater environments.

Direction 1 recognises that to reverse the environmental declines we are seeing, all Aucklanders must play their part in ensuring that the natural environment is valued and cared for. Aucklanders need to better understand and recognise the range of benefits and values that the natural environment provides, including habitat, recreation, tourism, providing us with clean water and air, as well as the critical role it plays in shaping and sustaining Auckland's future. Aucklanders must actively seek opportunities to protect and enhance these values through our short and long-term decisions.

Direction 2

Apply a Māori world view to treasure and protect our natural environment (taonga tuku iho)

Almost every environmental indicator is in steady decline. This means that current approaches and practices are not working. Drawing a stronger connection between Auckland's people, their environment and our shared cultural heritage has been identified as a key mechanism to deliver this step change environmental protection and enhancement. Te ao Māori concepts such as kaitiakitanga, rangatiratanga, whanaungatanga and manaakitanga offer Auckland an integrated approach to protecting and enhancing our treasured environments for ourselves and for future generations.

Direction 2 seeks to embed these concepts into our thinking and decision-making and support a focus on the interrelationships between the natural environment and people. Whilst these concepts, the acknowledgement of the interrelationship between the natural environment and people and way of viewing the world are rooted in Te ao Māori, they can be adopted and practised by everyone.

Direction 3

Use growth and development to protect and enhance Auckland's natural environment

The historic decline in Auckland's natural environment and cultural heritage will be exacerbated by future changes. Auckland should expect significant changes and disruption through climate change, extreme weather and increasing pressure on resources. Large areas will be developed and more intense development is expected in many urban areas.

Direction 3 recognises that as the region grows, we will need to account for these changes, using the opportunities that growth provides to adapt to these changes and to protect and enhance the natural environment. Auckland's future growth will bring greater levels of investment. Transport, stormwater and wastewater investments in particular will be some of the largest ever made in Auckland. We can use these investments to perform both their technical function and to protect or enhance the overall health of the environment and ecosystems.

Direction 4

Ensure Auckland's infrastructure is future-proofed

Auckland's infrastructure hasn't kept pace with growth and is a major contributor to the impacts we have seen on our environment and cultural heritage. Transport infrastructure can generate runoff whilst the limitations of our wastewater and stormwater networks have also contributed to the pollution of our waterways.

Direction 4 recognises that more sustainable infrastructure choices, like public transport, cleaner energy, green infrastructure and water sensitive design require further effort and support to embed in Aucklanders' minds as the new normal. Direction 4 also recognises that it is essential for Auckland's infrastructure to withstand short-term shocks, such as flooding. It also needs to work well in the long-term, particularly in the face of longer-term climatic changes.

Significant investment in new infrastructure, and upgrades or existing infrastructure will be required to support Auckland's growth. Doing this in a future focussed way, and using new approaches like green infrastructure will maximise the capacity and protect the environment. New infrastructure involves significant time and investment. We have to start now to create the systems and services we want in the future.

Focus Area 1

Encourage all Aucklanders to be stewards of the natural environment, and to make sustainable choices

Many of the negative environmental trends we are experiencing in Auckland stem from the actions and activities of people. Focus Area 1 addresses this by placing an emphasis on the engagement of all Aucklanders in its protection and conservation as stewards of the natural environment. This focus area recognises that Aucklanders interact with the natural environment each and every day. In our own ways we all value and enjoy the natural environment. As such, we all have a key to play in ensuring our many interactions with the natural environment are sustainable.

Focus Area 2

Focus on restoring environments as Auckland grows

Numerous areas and environments across Auckland have been degraded by past activities or simply through neglect. This focus area recognises that Auckland can use the processes of development and redevelopment to restore degraded ecosystems and places of cultural significance. To do this we need to:

- better understand where and how our environments are degraded
- actively seek out opportunities to restore environments and ecosystems as growth and redevelopment happens
- set minimum expectations for new development and the contribution they have to make
- ensure the impacts and opportunities of our developments are integrated from the start, rather than having to invest further resource to fix up mistakes later.

By restoring these places and ecosystems, we create new environments for local communities to connect with and enjoy, further building and creating Auckland's shared cultural heritage.

Focus Area 3

Account fully for the past and future impacts of growth

Focus Area 3 addresses the need for Auckland to learn from the past. The environmental declines we see now have been exacerbated by decision making that has not adequately recognised the broader and cumulative impacts of our actions. This focus area recognises that decision-making needs to fully account for the immediate and ongoing impacts of urban growth and its related projects. In order to reverse environmental decline and eliminate ongoing impacts, we must avoid short term solutions that create long term costs and consequences.

Focus Area 4

Protect Auckland's significant natural environments and cultural heritage from further loss

Auckland is home to a number of diverse and unique natural environments that are significant both in New Zealand and internationally. They can be significant for their ecological value as well as for the foundational role they play in our shared cultural heritage. Our marine environments, for example, provide unique habitats for species and places for Aucklanders to enjoy. Many of these environments are threatened by how they are currently treated and, unless we actively protect them, are likely to decline further as Auckland's population grows.

Focus Area 4 recognises that we must place a particular focus on these significant environments and cultural heritage to ensure that they are protected from further loss.

Focus Area 5

Adapt to a changing water future

Through the targeted stakeholder engagement process, water was consistently identified as a key concern for current and future generations. Water quality issues as well as the protection of key aquatic environments, such as Auckland's three harbours, were seen as priority areas for action. The strong relationship between Auckland's waters and its people, from the landing of the first waka in the region, through to the manner in which Auckland waterways play a key role in how Aucklanders choose to relax and connect was identified as aspects that should be protected and enhanced. It was however also recognised that Auckland's current water context is rapidly evolving, as a result of population growth, development and external factors such as climate change.

Focus Area 5 is about ensuring that Auckland adapts to this changing water future by:

- working towards solutions for meeting Auckland's long term drinking water requirements. This may include finding alternative supplies and will require reducing consumption
- minimising our negative effects on water quality and quantity, in both freshwater and marine environments
- improving our ability to manage and respond to the water related impacts of climate change such as flooding and droughts
- considering the impacts of a changing water future on the industries and activities that rely on water, such as agriculture, power generation and food processing.

Focus Area 6

Use green infrastructure to deliver greater resilience, long-term cost savings and quality environmental outcomes

Focus Area 6 addresses the challenges we face in ensuring Auckland's infrastructure is future proofed and minimising the impacts related to the construction and operation of our infrastructure networks. Using green infrastructure means replacing or supplementing traditional built infrastructure with natural and semi-natural systems. These natural systems are often able to perform more effectively and efficiently than traditional 'hard' infrastructure solutions. They also provide opportunities to improve degraded natural environments, improve local amenity and enhance long-term environmental resilience. As well as these benefits, the overall cost of green infrastructure can also be a fraction of constructed infrastructure solutions due to lower ongoing maintenance costs.

References

Amel, E., Manning, C., Scott, B., Koger, S. (2017) Beyond the roots of human inaction: Fostering collective effort toward ecosystem conservation. *Science*, 356(6335), 275-279.

Auckland Regional Council. (2001). *Background concentrations of inorganic elements in soils from the Auckland region*. Technical Publication 153. ISSN 1175-205X.

Auckland Regional Council. (2004) *Framework for assessment and management of urban streams in the Auckland region*. Environmental Management, Technical Publication 232.

Auckland Regional Council. (2008). *State of the environment monitoring: rivers and streams water quality data report 2006*. Auckland Regional Council Technical Publication 342.

Auckland Regional Council. (2009a). *Cultural heritage inventory*
<https://chi.net.nz/CulturalHeritage.aspx> [Accessed 8 February 2018]

Auckland Regional Council (2009b). *State of the Auckland region*. Auckland Regional Council. ISBN 978-1-877540-45-5.

Auckland Council. (2012a). Auckland's environment. *Auckland Plan*. Auckland: Auckland Council. Available at <https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/docsaucklandplan1to7/ac0807chapter7.pdf> [Accessed 8 February 2018]

Auckland Council. (2012b). Auckland's historic heritage. *Auckland Plan*. Auckland: Auckland Council. Available at <https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/docsaucklandplan1to7/chapter4aucklandhistoricheritage.pdf> [Accessed 8 February 2018]

Auckland Council. (2012c). *Getting Auckland's waste sorted – waste management and minimisation plan*. Auckland: Auckland Council. Available at <http://temp.aucklandcouncil.govt.nz/EN/environmentwaste/rubbishrecycling/wastemanagementandminimisationplan/Documents/finalaucklandwastemanagementandminimisationplan.pdf> [Accessed 8 February 2018]

Auckland Council. (2013). *Caring for urban streams: Guide 1- Flooding*. Auckland: Auckland Council. Available at <https://www.aucklandcouncil.govt.nz/environment/stormwater/docsbmpenvironmental1/caring-for-urban-streams-guide-1-flooding.pdf> [Accessed 8 February 2018]

Auckland Council. (2014). *Low carbon Auckland: Auckland's energy resilience and low carbon action plan*. Auckland: Auckland Council. Available at <http://temp.aucklandcouncil.govt.nz/EN/planspoliciesprojects/plansstrategies/theaucklandplan/Documents/lowcarbonauckactionplanfullversion.pdf> [Accessed 8 February 2018]

- Auckland Council. (2015). *The health of Auckland's natural environment in 2015*. Auckland: Auckland Council. Available at <https://www.aucklandcouncil.govt.nz/environment/state-of-auckland-research-report-cards/Pages/health-of-aucklands-natural-environment-2015.aspx> [Accessed 8 February 2018]
- Auckland Council. (2017a). *Auckland Council watershed current state story maps*. Auckland: Auckland Council. Available at <https://aucklandcouncil.maps.arcgis.com/apps/MapJournal/index.html?appid=13c6b96541884d8099da216a2206a2d0> [Accessed 8 February 2018]
- Auckland Council. (2017b). *National policy statement for freshwater management – update to environment and community committee workshop 14 June 2017*. http://infocouncil.aucklandcouncil.govt.nz/Open/2017/07/ENV_20170718_AGN_6830_AT_files/ENV_20170718_AGN_6830_AT_Attachment_54070_5.PDF [Accessed 8 February 2018]
- Auckland Council. (2017c). *LakeSPI assessment of 33 Auckland Lakes: 2017 update*, TR2017/028
- Auckland Council, (2018). *Draft Auckland Waste Management and Minimisation Plan 2018*. <https://www.aucklandcouncil.govt.nz/have-your-say/topics-you-can-have-your-say-on/waste-minimisation-management-plan/Documents/draft-auckland-waste-management-minimisation-plan-2018.pdf>
- Burns, N.; Bryers, G.; Bowman, E. (2000). *Protocol for monitoring trophic levels of New Zealand lakes and reservoirs*. Prepared for Ministry of the Environment by Lakes Consulting, March 2000. Available at <http://www.mfe.govt.nz/publications/water/protocol-monitoring-trophic-levels-mar-2000/index.html>
- Bishop, C. and Laurence, G. (2017). *The urban forest of Waitemata local board in 2013*. Auckland Council technical report, TR2017/006.
- Buxton, R.T. (2013). *Incidence of plastic fragments among burrow-nesting seabird colonies on offshore islands in Northern New Zealand*. Retrieved from <http://onemoregeneration.org/wp-content/uploads/2012/07/Incidence-of-plastic-fragments-among-burrow-nesting-seabird-colonies-on-offshore-islands-in-northern-New-Zealand.pdf>
- Collier, K., Aldridge, M., Hicks, B., Kelly, J., Macdonald, A., Smith, B. and Tonkin, J. (2009). Ecological values of Hamilton urban streams (North Island, New Zealand): constraints and opportunities for restoration. *New Zealand Journal of Ecology*, 33(2), 177-189.
- Constantine, R., Johnson, M., Riekkola, L., Jervis, S., Kozmian-Ledward, L., Dennis, T., Torress, L. and Aguilar de Soto, N. (2015). Mitigation of vessel-strike mortality of endangered Bryde's whales in the Hauraki Gulf, New Zealand. *Biological Conservation*, 186, 149-57.

- Crothers, C. (no date). Aucklanders attitudes to Auckland's growth and environment. https://icdc.aut.ac.nz/data/assets/pdf_file/0007/73627/aucklanders_attitudes_to_auckland_growth_and_environment.pdf. [Accessed 9 February 2018]
- Curran-Cournane, F., Holwerda, N. and Mitchell, F. (2013). *Quantifying catchment sediment yields in Auckland*. Auckland Council technical report, TR2013/042
- Curran-Cournane, F., Vaughan, M., Memon, A., and Fredrickson, C. (2014): Trade-offs between high class land and development: Recent and future pressures on Auckland's valuable soil resources. *Land Use Policy*, 39, 146-154.
- Curran-Cournane, F. (2015). Soil quality state and trends in New Zealand's largest city after 15 years. *International Journal of Environmental, Ecological, Geological and Geophysical Engineering*, 9, 227-234.
- Curran-Cournane, F., Lear, G., Schwendenmann, L. and Khin, J. (2015). Heavy metal soil pollution is influenced by the location of green spaces within urban settings. *Soil Research* (accepted DOI: 10.1071/SR14324).
- Davy, P., Trompetter, W., and Markwitz, A. (2016). Source apportionment of airborne particles in the Auckland Region, *GNS Science Consultancy Report 2010/262*.
- Davy, P., Ancelet, T., Trompetter, W., and Markwitz, A. (2017). Source apportionment and trend analysis of air particulate matter in the Auckland Region, *GNS Science Consultancy Report 2014/194*. 215 p.
- de Winton, M. and Edwards, (2012). *Assessment of Auckland lakes* Auckland Council Technical Report 2012/034.
- Doppelt, B. (2008). *The power of sustainable thinking: how to create a positive future for the Climate, the Planet your Organisation and your life*. Taylor and Francis, London. ISBN 978-1-11365524-5-8.
- Environmental Defence Society (EDS). (2016). *Pathways to Prosperity: Safeguarding biodiversity in development*. EDS Guide Series, Environmental Defence Society, Auckland. ISBN 978-0-9876660-6-2.
- Eunomia. (2016). *Plastics in the marine environment*. <http://www.eunomia.co.uk/reports-tools/plastics-in-the-marine-environment/>
- Foekema, E., Gruijter, C., Mergia, M., Andries van Franeker, J., Murk, A., and Koelmans, A. (2013). *Plastic in North Sea Fish*. <http://pubs.acs.org/doi/pdf/10.1021/es400931b>
- Forest and Bird. (2017). Auckland. <http://www.forestandbird.org.nz/whats-on-in-your-area/regions/auckland>
- Gadd, J and Cameron, M. (2012). Antifouling biocides in marinas: measurement of copper concentrations and comparison to model predictions for eight Auckland sites. Prepared by NIWA for Auckland Council. Auckland Council technical report, TR2012/033

Gaskin, C. and Rayner, M. (2013). *Seabirds of the Hauraki Gulf: natural history, research and conservation*. Auckland: Hauraki Gulf Forum.

Gelsthorpe, J. (2017). *Disconnect from nature and its effect on health and well-being*. <http://www.nhm.ac.uk/content/dam/nhmwww/about-us/visitor-research/Disconnect%20with%20nature%20Lit%20review.pdf> [Accessed 9 February 2018]

Greenhalgh, S., Samarasinghe, O., Curran-Cournane, F., Wright, W. and Brown, P. (2017). Using ecosystem services to underpin cost–benefit analysis: Is it a way to protect finite soil resources? *Ecosystem Services*, 27, 1-14.

Hailes, S. and Carter, K. (2015). *Kaipara Harbour ecological monitoring programme: report on data collected between October 2009 and February 2014*. Prepared for Auckland Council by the National Institute of Water and Atmospheric Research Ltd. Auckland Council technical report, TR2015/008

Hamill, K. and Lockie, S. (2015). State of the environment monitoring. *Auckland lake water quality: state and trends*. Auckland Council technical report, TR2015/007

Hauraki Gulf Forum. (2011). *State of our Gulf: Tikapa Moana Hauraki Gulf state of the environment report 2011*. Hauraki Gulf Forum, Auckland.

Hauraki Gulf Forum. (2014). *State of our Gulf: Tikapa Moana Hauraki Gulf state of the environment report 2014*. Hauraki Gulf Forum, Auckland.

Hauraki Gulf Forum. (2017). *State of our Gulf: Tikapa Moana Hauraki Gulf state of the environment report 2017*. Hauraki Gulf Forum, Auckland.

Hewitt, J. and Ellis, J. (2010): *Assessment of the benthic health model*. Prepared by NIWA for Auckland Regional Council, Auckland Regional Council Technical Report TR2010/034.

Hicks, D., Hoyle, J, and Roulston, H. (2009). *Analysis of sediment yields within the Auckland Region*. Prepared by NIWA for Auckland Regional Council. Auckland Regional Council Technical Report, TR2009/064

Holland, K. and Buckthought, L. (2015). *State of the environment monitoring: river water quality annual report 2014*. Auckland Council Technical Report, TR2015/028.

Holland, K., Stanley, C. and Buckthought, L. (2016). *State of the environment monitoring: river water quality annual report 2015*. Auckland Council Technical Report, TR2016/034

IUCN. (no date). *Connecting nature and culture*. <https://www.iucn.org/theme/world-heritage/our-work/global-world-heritage-projects/connecting-nature-and-culture> [Accessed 9 February 2018]

Kadijk, G., van Mensch, P., and Spreen, J. (2015). *Detailed investigations and real-world emission performance of Euro 6 diesel passenger cars* (No. TNO 2015 R10702). Delft, The Netherlands: TNO Earth, Life & Social Sciences.

- Kennedy, P. and Sutherland, S. (2008). *Urban Sources of Copper, Lead and Zinc*. Prepared by Golder Associates for Auckland Regional Council. Auckland Regional Council Technical Report 2008/023.
- Ligterink, N., Kadijk, G., van Mensch, P., Hausberger, S., & Rexeis, M. (2013). *Investigations and real world emission performance of Euro 6 light-duty vehicles* (No. TNO 2013 R11891). Delft, The Netherlands: TNO Earth, Life & Social Sciences.
- Kesebir, S. and Kesebir, P. 2017. A growing disconnection from nature is evident in cultural products. *Perspectives on psychological science*, 12:2. Pp 258-269.
- Kuschel, G., Metcalfe, J., Wilton, E., Guria, J., Hales, S., Rolfe, K. and Woodward, A. (2012A). *Updated Health and Air Pollution in New Zealand Study: Volume 1: Summary Report*.
http://www.hapinz.org.nz/HAPINZ%20Update_Vol%201%20Summary%20Report.pdf
- Kuschel, G., Bluett, J. and Unwin, M. (2012B). *Trends in light duty vehicle emissions 2003 to 2011*. Prepared by NIWA and Emission Impossible Ltd for Auckland Council. Auckland Council technical report TR2012/032.
- Lam, H., Kok, M. and Shum, K. 2012. Benefits from typhoons – the Hong Kong perspective. *Weather* 67, pp 16-21.
- Lockie, S and Neale, M.W. (2014). *State of the Environment Monitoring: River Water Quality Annual Report 2013*. Auckland Council Technical Report, TR2014-032
- Longley, I., Salmond J., Dirks K and others (2014). *Personal exposure to noise and air pollution (PENAP) in the Queen Street valley, Auckland*. Prepared by the University of Auckland, AUT and NIWA for Auckland Council. Auckland Council technical report, TR2014/036
- Longley, I., Tunno, B., Clougherty, J., (2016). *Spatially Resolved Technique for Source Apportionment in New Zealand: A pilot study*. NIWA Report. Auckland Council.
- MartinJenkins Consultants, 2017. *Safeswim Programme Review*, Report to Auckland Council.
http://infocouncil.aucklandcouncil.govt.nz/Open/2017/02/ENV_20170214_AGN_6825_AT_SUP_WEB.htm
- McBride, G. and Soller, J. (2017). *Technical background for 2017 MfE 'Clean Water' swimmability Proposals for Rivers*. NIWA report FWWQ1722.
<https://niwa.co.nz/sites/niwa.co.nz/files/Swimmability%20Paper%2010%20May%202017%20FINAL.pdf>
- Mcilgorm, Alistair & Campbell, HF & Rule, Michael. (2009). *Understanding the economic benefits and costs of controlling marine debris in the APEC region* (MRC 02/2007).
https://www.researchgate.net/publication/264159354_Understanding_the_economic_benefits_and_costs_of_controlling_marine_debris_in_the_APEC_region_MRC_022007
- Meijer, K., Buckthought, L., Curran-Cournane, F., Martindale, M., Prebble, N and Long, L

(2016). *Elevated nitrate concentrations in Franklin surface and groundwater: a review*. Auckland Council technical report, TR2016/015.

Meyer, J.L., Paul, M.L. and Taulbee, W.K. (2005). 'Stream Ecosystem Function in Urbanizing Landscapes' *Journal of the North American Benthological Society*, 24, 602-612.

Ministry for the Environment & Statistics New Zealand (MfE) (2015). *New Zealand's Environmental Reporting Series: Environment Aotearoa 2015*. Available from www.mfe.govt.nz and www.stats.govt.nz.

Ministry for the Environment (MfE), (2017). *Suitability for swimming map*.
<http://www.mfe.govt.nz/sites/default/files/media/Auckland%20map.jpg>

Miller, J. and Franco, V. (2016). *Impact of improved regulation of real-world NOx emissions from diesel passenger cars in the EU, 2015-2030*. International Council on Clean Transportation white paper.
http://www.theicct.org/sites/default/files/publications/ICCT_real-world-NOX-RDE-2015-2030_dec2016.pdf

Ministry of Transport. (2016). *Annual Fleet Statistics, 2016*.
<http://www.transport.govt.nz/assets/Uploads/Research/Documents/Fleet-reports/The-NZ-Vehicle-Fleet-2016-web.pdf>

New Zealand Government. (2017). *National Policy Statement for Freshwater Management 2017*.

New Zealand Herald. (2017). *Auckland's Environment: Four Perspectives*.
http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11914922

NIWA. (2017). *Auckland Region climate change projections and impacts*.
<http://www.knowledgeauckland.org.nz/publication/?mid=1747&DocumentType=1&>

Noble, A and Neale, M W (2016). *Auckland west coast lagoons: sources of faecal contamination*. Auckland Council technical report, TR2016/012.

OECD (2017A), *OECD Environmental Performance Reviews: New Zealand 2017*, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264268203-en>

OECD (2017B) *Behavioural Insights and Public Policy: Lessons from Around the World*. OECD Publishing, Paris.

Parkes, S M and Lundquist, C (2015). *Central Waitematā Harbour ecological monitoring: 2000-2014*. Prepared by the National Institute of Water and Atmospheric Research (NIWA) for Auckland Council. Auckland Council technical report, TR2015/006

Reid, H., Gregory, C. and Brierley, G. (2008) Measures of physical heterogeneity in appraisal of geomorphic river condition for urban streams: Twin Streams catchment, Auckland, New Zealand. *Physical Geography* 29:3, pp. 247-274.

Reid, N (2014). *Benzene, 1,3 butadiene and other volatile organic compounds in Auckland, 2001-2013*. Auckland Council technical report, TR2014/037

- Rochman, C.M., Tahir, A., Williams, S.L., Baxa, D.V., Lam, R., Miller, J.T. (2015) *Anthropogenic debris in seafood: Plastic debris and fibres from textiles in fish and bivalves sold for human consumption*. <http://www.nature.com/articles/srep14340>
- Rockström, J., W. Steffen, K. Noone, Å. Persson, F. S. Chapin, III, E. Lambin, T. M. Lenton, M. Scheffer, C. Folke, H. Schellnhuber, B. Nykvist, C. A. De Wit, T. Hughes, S. van der Leeuw, H. Rodhe, S. Sörlin, P. K. Snyder, R. Costanza, U. Svedin, M. Falkenmark, L. Karlberg, R. W. Corell, V. J. Fabry, J. Hansen, B. Walker, D. Liverman, K. Richardson, P. Crutzen, and J. Foley. 2009. Planetary boundaries: exploring the safe operating space for humanity. *Ecology and Society* **14**(2): 32. Royal Albatross Centre, unknown. *Tracking our trash*. Retrieved from <http://albatross.org.nz/wp-content/uploads/trash.pdf>
- Smith, J., Peterson, J. and Gray, S. (2009). *Benzene 1,3 butadiene and other volatile organic compounds in Auckland*. Auckland Regional Council Technical Report 2009/048.
- Snelder, T.; Shankar, U.; Dey, K.; Hurren, H. (2006). Development of variables for Freshwater Environments of New Zealand (FWENZ): Lakes. *NIWA Client report CHC2006-065*, prepared for the Department of Conservation. 14 p.
- Snelder, T., Wood, S., Atalah, J. (2016). Strategic assessment of New Zealand's freshwaters for recreational use: a human health perspective: Escherichia coli in rivers and planktonic cyanobacteria in lakes. *Land Water People Client Report 2016-011*.
- Sridhar, S., Wickham, L. and Metcalfe, J. (2014): *Future trends in motor vehicle emissions in Auckland*. Prepared by Emission Impossible Ltd for Auckland Council. Auckland Council technical report, TR2014/028
- Stanley, M. C., Beggs, J. R., Bassett, I. E., Burns, B. R., Dirks, K. N., Jones, D. N., . . . Gaston, K. J. (2015). Emerging threats in urban ecosystems: a horizon scanning exercise. *Frontiers in Ecology and the Environment*, **13**(10), 553- 560. doi:10.1890/150229
- Talbot, N and Reid, N (2017). *A review of research into the effects of shipping on air quality in Auckland: 2006-2016*. Auckland Council technical report, TR2017/005
- Talbot, N., Reid, N. and Crimmins, P. 2017. *Auckland Ambient Air Quality Trends for PM_{2.5} and PM₁₀ – 2006-2015*. Auckland Council Technical Report, TR2017/029.
- Townsend, M., Greenfield, B and Cartner, K (2015). Upper Waitematā Harbour ecological monitoring programme 2005-2014: current status and trends. Prepared by the National Institute of Water and Atmospheric Research (NIWA) for Auckland Council. Auckland Council technical report, TR2015/009
- UNEP, (2016). *Emerging issues of environmental concern*. Retrieved from http://web.unep.org/frontiers/sites/unep.org.frontiers/files/documents/unep_frontiers_2016.pdf
- Van Cauwenberghe, L. and Janssen, C. (2014) Microplastics in bivalves cultured for human consumption, *Environmental Pollution* **193**, pp.65-70.

Vecco, M. 2010. *A definition of cultural heritage: From the tangible to the Intangible*. *Journal of Cultural Heritage* 11, pp 321 – 324.

Walker JW, van Duivenboden R, Neale MW (2015). A tiered approach for the identification of faecal pollution sources on an Auckland urban beach. *New Zealand Journal of Marine and Freshwater Research* 49: 333-345.

Walsh, C., Booth, D., Burns, M., Fletcher, T., Hale R., Hoang, L., Livingston, G., Rippy, M., Roy, A., Scoggins, M., and Wallace, A. (2016). Principles for urban stormwater management to protect stream ecosystems. *Freshwater Science* 2016 35:1, 398-411

WWF. (2016). *Living Planet Report*.

http://awsassets.panda.org/downloads/lpr_living_planet_report_2016.pdf

Xie, S., Sridhar, S and Metcalfe, J (2014). *Auckland air emissions inventory 2006*. Auckland Council technical report, TR2014/015

Xie, S (2017). *Auckland's greenhouse gas inventory to 2015*. Auckland Council technical report, TR2017/026

Appendix 1: Further detail on the Resource Management Act framework

National Environmental Standards

To ensure consistency of approach nationally, central government can collaborate with local government to set standards, known as National Environmental Standards (NES). An NES can be technical in nature prescribing methods or requirements for monitoring. They can be a minimum standard that councils can set stricter rules than, or can prescribe the rule that must be adopted. NESs currently in force as regulations include Air Quality, Plantation Forestry, Sources of Drinking Water and for assessing and managing Contaminants in Soil to Protect Human Health. The regulations for Air Quality, for example, set minimum standards for regional councils to manage their air quality towards. NESs in development include plantation forestry, marine aquaculture and ecological flows and water levels.

National Policy Statements

National policy statements (NPS) enable central government to prescribe objectives and policies on resource management matters of national significance. These statements can be broad in scope and guide subsequent decision-making under the RMA at the national, regional and district levels. Regional policy statements and plans and district plans must give effect to all national policy statements. Currently, there are NPSs in place for Urban Development Capacity, Renewable Electricity Generation, Electricity Transmission and Freshwater Management, with additional work being undertaken on an NPS for Indigenous Biodiversity. The National Policy Statement for Freshwater Management, which was revised in 2017, is of particular significance for Auckland at present and is described further below.

National Policy Statement for Freshwater Management 2014

The National Policy Statement for Freshwater Management 2014 (NPS-FM) directs local authorities on how to carry out their RMA responsibility for managing freshwater. Water quality and quantity is of national significance, given the value that local communities place on it for a range of uses, and the diverse range of pressures on New Zealand's water resources, like agriculture, irrigation and urban development.

The NPS-FM requires regional councils, in consultation with their communities, to set objectives for the state of freshwater, like lakes, rivers and streams in their regions, and ensure that resource use does not prevent these objectives from being met. Some of the key objectives of the NPS-FM are:

- safeguard freshwater's life-supporting capacity, ecosystem processes, and indigenous species.

- safeguard the health of people who come into contact with the water.
- maintain or improve the overall quality of fresh water within a freshwater management unit.
- improve water quality so that it is suitable for primary contact more often.
- protect the significant values of wetlands and outstanding freshwater bodies.
- follow a specific process (the national objectives framework) for identifying the values that tāngata whenua and communities have for water, and using a specified set of water quality measures (called attributes) to set objectives.
- set limits on resource use (e.g., how much water can be taken or how much of a contaminant can be discharged) to meet limits over time and ensure they continue to be met.

The NPS-FM was amended in 2017 to support an additional target of 90% swimmable lakes and rivers by 2040. This target places additional requirements on regional councils to improve water quality and their progress towards achieving the targets. The changes also included additional changes, like requiring councils to manage nutrient loads and consider the economic well-being of communities during plan development.

The New Zealand Coastal Policy Statement 2010 (NZCPS)

The New Zealand Coastal Policy Statement 2010 (**NZCPS**) states the objectives and policies for achieving sustainable management under the RMA. The NZCPS sets matters of national importance, including environmental preservation and values of importance to tangata whenua, and guides local authorities on how to manage and set objectives for their coastal environments. It also places a mandatory requirement on regional councils to prepare a regional coastal plan.

Regional scale statements and plans

The RMA requires Regional councils to prepare a Regional Policy Statement (RPS)⁷, which sets out the issues, methods and approaches for resource management, but cannot contain rules. RPSs are required to state significant resource management issues for the region, the objectives sought to be achieved and methods to implement the rules. As Auckland Council is a unitary authority, Auckland Council accordingly prepares and gives effect to the RPS.

To achieve the purpose of the RMA and carry out their functions, regional councils prepare a Regional Plan (RP) and a Regional Coastal Plan (RCP). RPs and RCPs are designed to give effect to National and Regional Policy statements, and provide the objectives, policies and rules to deliver the RPS and issues within the control of Regional Councils like water quality and quantity, air quality and biodiversity.

⁷ The Auckland Unitary Plan incorporates an RPS for the Auckland region

Auckland Unitary Plan 2016 (Operative in Part)

The Auckland Unitary Plan became 'Operative in Part' in November 2016. It is the first combined plan for the Auckland Region and functions as Auckland Council's Regional Policy Statement, Regional Plan and Regional Coastal Plan. The Unitary Plan provides the supporting framework for growth, determining what can be built and where – it determines how we will create a higher quality, compact city, which has environmental benefits. The plan outlines how we will provide for rural, industrial and residential activities, and outlines the environments and features we will protect through policies, objectives and rules.

Other relevant Legislation

Local Government (Auckland Council) Act 2009

Local Government (Auckland Council) Act 2009 (LGACA) established Auckland Council as the Unitary Authority for Auckland and defines its structure, functions and how Auckland Council will operate. It requires Auckland Council to develop and adopt a spatial plan, and details specific requirements of the spatial plan, and requires that the Auckland Plan:

Identify nationally and regionally significant—

- (i) recreational areas and open-space areas within Auckland; and*
- (ii) ecological areas within Auckland that should be protected from development; and*
- (iii) environmental constraints on development within Auckland (for example, flood-prone or unstable land); and*
- (iv) landscapes, areas of historic heritage value, and natural features within Auckland*

Biosecurity Act 1993

The Biosecurity Act 1993 is intended to control the spread and effect of unwanted organisms, establishing border controls and identifying the responsibilities of government departments and regional councils. Regional councils are required to perform monitoring and surveillance of established pests, like kauri dieback or marine pests like Mediterranean Fanworm (Sabella). Regional councils can also prepare and implement regional pest management strategies. Auckland Council has a Regional Pest Management Strategy described later in this section.

Heritage New Zealand Pouhere Taonga Act 2014

The Heritage New Zealand Pouhere Taonga Act 2014 (the Act) replaced the Historic Places Act 1993. The Act aims to assist in the identification, protection and conservation of the historical and cultural heritage of New Zealand, through the following principles:

- a) the principle that historic places have lasting value in their own right and provide evidence of the origins of New Zealand's distinct society; and*
- b) the principle that the identification, protection, preservation, and conservation of New Zealand's historical and cultural heritage should—*
 - i. take account of all relevant cultural values, knowledge, and disciplines; and*

- ii. *take account of material of cultural heritage value and involve the least possible alteration or loss of it; and*
- iii. *safeguard the options of present and future generations; and*
- iv. *be fully researched, documented, and recorded, where culturally appropriate; and*
- c) *the principle that there is value in central government agencies, local authorities, corporations, societies, tangata whenua, and individuals working collaboratively in respect of New Zealand's historical and cultural heritage; and*
- d) *the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tūpuna, wāhi tapu, and other taonga.*

Auckland Council gives effect to these principles through heritage provisions in the Unitary Plan (as part of its function as a Regional Policy Statement, Regional Plan and Regional Coastal Plan). Heritage is also considered in assessment of environmental impacts for resource consent applications.

Hauraki Gulf Marine Park Act 2000

The Hauraki Gulf Marine Park Act 2000 (the HGMPA) provides special recognition for the Hauraki Gulf as a nationally significant environment, worthy of special protection and management for its habitats and species, as stated in the preamble:

"Hauraki Gulf has a quality and diversity of biology and landscape that makes it outstanding within New Zealand. The islands of the Gulf are valued as the habitats of plants and animals, once common, now rare, and are often the only places in the world where these species exist naturally"

The HGMPA recognises the relationship between the land and receiving environments, and contends that a whole of catchment approach is required to maintain the life-supporting capacity of the Gulf. The HGMPA also requires conservation of the cultural and historic associations of people and communities in the Hauraki Gulf. To further these objectives, the HGMPA established the Hauraki Gulf Forum, as a cross agency and tangata whenua group, to act as a group to progress the integrated management of the Hauraki Gulf Marine Park, which was also established by the HGMPA, to conserve unique environments.

Marine and Coastal Areas Act (Takutai Moana) Act 2011

The Marine and Coastal Areas Act (Takutai Moana) Act 2011 was created to replace the controversial Foreshore and Seabed Act 2004 and restore the customary interests extinguished by that Act. It acknowledges the importance of the marine and coastal area (the area between mean high water springs and the outer limits of the territorial sea – 12 nautical miles from shore) to all New Zealanders and provides for the recognition of customary rights of iwi, hapu and whanau in the common marine and coastal area, i.e. the parts of the marine and coastal area that are not in private ownership or part of a

conservation area. The Act also guarantees public access to the common marine and coastal area for recreational purposes.

The implications of this Act for Auckland Council are that these customary rights must be recognised and provided for in both plan-making activities and when considering and granting applications for resource consents.

Waitakere Ranges Heritage Area Act 2008

The Waitakere Ranges Heritage Area Act 2008 (the WRHAA) provides direction for Auckland Council in making policy and planning decisions relating to the Waitakere Ranges Heritage area (around 27,000 ha). The WRHAA recognises the local, regional and national significance of the area, and the diversity of terrestrial and aquatic ecosystems within the area, which are to be protected and enhanced. Its goal is to use the RMA framework to introduce more detailed considerations into local planning.

Waste Minimisation Act 2008

The Waste Minimisation Act 2008 intends to manage, control and reduce the amount of waste generated from all sources in New Zealand, and required territorial authorities to prepare waste management and minimisation plans (WMMPs) by 2012, to be reviewed every 6 years. The purpose of these plans is to set objectives, policies and methods to efficiently manage waste in the region, and describe how this will be funded.

Auckland Council strategies

Auckland Council's strategic approach to environmental and heritage matters is incorporated into a number of different subject-based strategies and plans. The most significant of these outline below:

Low Carbon Auckland 2014

Released in July 2014, details how Auckland will progress its transformation towards a sustainable, low carbon future. Five key transformational changes in travel, energy use, green infrastructure, waste and natural carbon assets are outlined to support this transition. The plan aims to reduce gross greenhouse gas emissions by 5.3 million tonnes, while supporting growth, development and a higher quality of life. The plan supports individuals to choose low-carbon alternatives, supporting low carbon living. The plan also sets region wide goals, like improved air quality and lower reliance on fossil fuels. Auckland Climate Action Plan, currently in development, will combine adaptation and mitigation measures for Auckland and will supercede Low Carbon Auckland once it is adopted by Council.

Auckland Growing Greener 2016

Released in August 2016, describes Auckland Council's role and commitments to deliver the environmental outcomes for Auckland that underpin the Auckland Plan vision. It sets out to support Auckland to grow in a way that recognises that a flourishing environment underpins the region's success. In order to do so, we must find new ways of doing things,

and all Aucklanders can contribute individually, leading to combined impact. Progress is measured by short-indicators and long-term targets.

SeaChange Tai Timu Tai Pari 2016

A collaborative Marine Spatial Plan, was produced by an independent working group, and released in December 2016. SeaChange is non-statutory and non-binding on agencies. The plan sets an ambitious vision for the Hauraki Gulf, aiming to elevate the health of the Hauraki Gulf to be the key planning objective for all activities in, and in the catchments of, the Hauraki Gulf. The objectives of the plan are aligned with Auckland Council activities, and provide a basis for collaboration between agencies active in the Gulf.

Regional Pest Management Strategy 2007-2012

Provides a strategic framework for efficient management of plant and animal pests in the Auckland region, with an overall goal of helping communities to create and maintain pest-free habitats. The strategy proposes an integrated approach, between Auckland Council, local agencies and the community, supporting an overall outcome of improving biodiversity and minimising pests

Urban Forest Strategy 2018

Adopted in February 2018, this strategy sets out a vision and three main objectives for improving and protecting Auckland's urban forest. It includes measures, and an implementation framework for delivering the strategy in partnership with communities.

Indigenous Biodiversity Strategy 2012

Released in July 2012, recognises that biodiversity is everywhere in the region and we need to consider our impacts on biodiversity in all activities, especially as the region grows and develops. The region is home to significant environments and outstanding natural features, and the strategy provides a framework for protecting and enhancing biodiversity, delivering on Auckland Council's statutory responsibilities.

Auckland Council Plans

In addition to the Unitary Plan, described above as part of the RMA framework, the Council has approved a number of management plans in recent years, which, together, provide direction on environmental and heritage management. The most significant of these are outlined below:

Integrated Catchment Management Plans

As part of Auckland Council's implementation of the NPS-FM, are watershed-based plans designed to improve freshwater environments. The plans are developed in collaboration with communities and are based on assessing the current state of catchments, the values and goals that the community set for the catchment. They include monitoring and performance frameworks to assess progress. The first phase of the project, to report on the current state of Auckland watersheds, was completed in November 2017.

Waste Management and Minimisation Plan 2012

To support reducing waste, reusing and recycling more through a zero waste goal by 2040. The plan, adopted in June 2012, covers all aspects of waste management from collection to treatment and disposal through key actions, focused on supporting people to access sustainable waste options. A proposed refresh of this plan was released for consultation in 2018.

Open Space Strategic Asset Management Plan 2015-2025

Recognises that as the city grows there will be increasing demands on our parks and open space networks. These places provide connection to the environment places to recreate and are important contributors to people's sense of place.

How the region manages its stormwater has important implications for the environment, particularly freshwater and marine receiving environments.

The Stormwater Asset Management Plan 2015-2045

Determines how we manage our stormwater, supports the use of green infrastructure and minimisation of contaminants making it into the environment.

Watercare Asset Management Plan 2016-2036

Similarly, how drinking water and wastewater services are provided plays an important role in the growth of the city and the quality of our environment. A safe and resilient water supply is critical to supporting Aucklanders. Appropriate wastewater treatment is important for supporting growth, by unlocking capacity, and minimising overflow of the wastewater network, resulting in reduced water quality and impacting on safe swimming at our beaches.

