Meola Reef Reserve Te Tokaroa

Development Plan

Waitematā Local Board
Auckland Council

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Bird's eye view - 1965. Meola Reef Reserve Te Tokaroa | Te Tokaroa viewed from the southeast, prior to landfill activites. Source Auckland City Libraries Heritage Images

1 Introduction and background

1.1 Foreword

Meola Reef Reserve Te Tokaroa is a significant reserve in the Waitematā Local Board area and the Auckland region for its richness in history, geology, ecology and its diverse community use.

We recognise Meola Reef Reserve Te Tokaroa as a significant historical mahinga kai site that provided food for Māori travelers in the past. Today it forms part of a treasured network of open spaces and has become widely appreciated for its off-leash dog area. We want to ensure the reserve will continue to provide for the future needs of Aucklanders.

This development plan provides a holistic direction towards improving outcomes for a range of community needs. Our vision includes enhancing the biodiversity and creating a habitat for the native wildlife, better connecting people to the coast, and continuing to be a destination that is enjoyed by walkers, runners, dog owners and other recreational users.

The plan includes provision for a loop path to allow access to the coast and appreciation of the area for its 'wild nature'. The plan intends to relocate and increase the off-leash area without compromising ecological outcomes.

We thank our mana whenua partners, key stakeholders and our passionate park users that 'got involved' to share their thoughts and feedback for this plan. This valuable input has created a collective vision that we are proud to adopt and share.

It has been a great responsibility for the Waitematā Local Board to lead the creation of the Meola Reef Reserve Te Tokaroa Development Plan. We hope this plan serves well as a framework to guide and enable great outcomes for Meola Reef Reserve Te Tokaroa over the next 10 years and longer.

Shale Chambers, Deputy Chair
Waitematā Local Board

1.2 Location

Meola Reef Reserve Te Tokaroa (‘toka’ meaning ‘rock’ and ‘roa’ meaning ‘long’), is located at 171 - 181 Meola Rd, Waitematā, Auckland Tāmaki Makaurau. It is located on Auckland’s longest lava flow between Meola Creek / Waititiko (meaning “water of the periwinkles”) and Motions Creek / Waiorea (meaning the “waters of the eel”). Meola Reef forms part of a network of open spaces that includes Seddon Fields and Jaggers Bush Reserve, Auckland Zoo and Western Springs.

Meola Reef is approximately 14.75 hectares. The current land zone use is Open Space Conservation Zone and Coastal - Coastal Transition Zone.

1.3 Consultation

The consultation process involved a wide range of participants. Utilising the International Association for Public Participation (IAP2) Spectrum of Participation1 as a reference, people involved in the development plan fall into two distinct groups with corresponding levels of engagement. Project Partners, who include mana whenua, Waitematā Local Board and council staff, have been involved in key decisions regarding the design. Their concerns and aspirations have been understood and considered in decision making (Involve + Collaborate).

Key stakeholders, including existing park users and the general public, have been consulted to ensure that their concerns and aspirations have been understood and considered, to obtain feedback on the developing design, and have been provided with information to assist them in understanding the opportunities and constraints associated with the site (Inform + Consult + Involve).

The consultation process has been organised into two distinct phases. The first phase involved pre-concept engagement and consultation to gain a deeper understanding of the site and the concerns, needs and desires of mana whenua, council and community. The second phase involved sharing the draft concept design with the same organisations and user groups to gather feedback to inform the final development plan.

Phase One
Pre-concept Consultation

The purpose of the pre-concept consultation was to ensure that key concerns and desires were expressed and shared prior to developing a design for the reserve. The pre-concept consultation involved several methods - presentations and meetings, a site walkover, public open day, as well as manual and digital submissions. The site walkover involved mana whenua representatives and Waitematā Local Board members and the presentations and meetings also included council staff. A public open day was held on the Tuesday, 2 May 2017 at the Western Springs Association Football Club, across the road from Meola Reef Reserve Te Tokaroa.

Mana whenua involved in the meetings and / or the site walkover included Ngāi Tai ki Tāmaki, Ngaati Whanaunga, Te Ākitai Waiohua, Ngāti Te Ata Waiohua, Te Rūnanga o Ngāti Whātua.
The site walkover also involved the Waitematā Local Board.
The presentations and meetings involved mana whenua, the Waitematā Local Board and a range of council staff with different areas of expertise.

The public open day was advertised through on site signs and via email to known stakeholders. The event was staffed by council staff, consultants and members of the Waitematā Local Board to discuss the reserve and the development plan process. Attendance by the public was low, however the people who did attend stayed for the majority of the two hours and spoke extensively with staff and attending council board members about the park. Twenty-two manual and digital submissions were also received. As with the open day, while the number of respondents was low, the quality of the information was high.

Virtually all of the respondents stated the desire to maintain and/or enhance the off-leash dog area at Meola Reef Reserve Te Tokaroa. Of these respondents, most recognised the need to balance the off-leash area with areas for nature conservation. Many of these respondents also identified access to Meola and Motions Creek as a key feature they would like to see maintained, despite the known health risks associated with the poor water quality.

Lack of car parking was raised by approximately half of respondents. Another theme running through many of the submissions was the desire to maintain the current 'wild' natural character of the site. Other issues that were raised through the feedback included the desire to restore the natural environment with additional areas of native vegetation, improve the quality of the water on site, and improve the maintenance of reserve infrastructure, particularly the paths.

The first phase of consultation revealed:

- Existing users are passionate about the reserve
- A strong desire to retain and improve the dog off-leash area
- A strong desire to maintain and enhance ecological values
- A need to balance dog walking and other activities to improve safety and ecological outcomes
- The multi-layered history of the site should be revealed, explained and celebrated
- Key issues include parking, safe connection to the wider path network, and the sense of safety (forest areas, off-leash dogs)
- There are currently no community groups engaged in ecological enhancement
- A desire to provide for coastal connectivity east and west of the site.

Phase Two
Draft Development Plan Consultation

The purpose of consultation at this stage was to provide further opportunity for stakeholders to share their views about the reserve in its current state, as well as to inform final changes and refinements to the plan. The draft Development Plan consultation involved several methods - presentations, workshops and meetings with project partners, as well as manual and digital feedback from key stakeholders, primarily through the Have Your Say website. The presentations, workshops and meetings involved mana whenua, the Waitematā Local Board and a range of council staff with different areas of expertise.

Mana whenua involved in the Phase 2 consultation process were Ngaati Whanaunga, Ngāti Māru, Te Ākitai Waiohua, Ngāti Tamaoho, Ngāti Te Ata Waiohua, Te Ahiwaru and Ngāi Tai ki Tāmaki.

In total 68 individuals and organisations provided feedback on the draft Plan via the Have Your Say website. An additional 3 submissions were provided through other channels.

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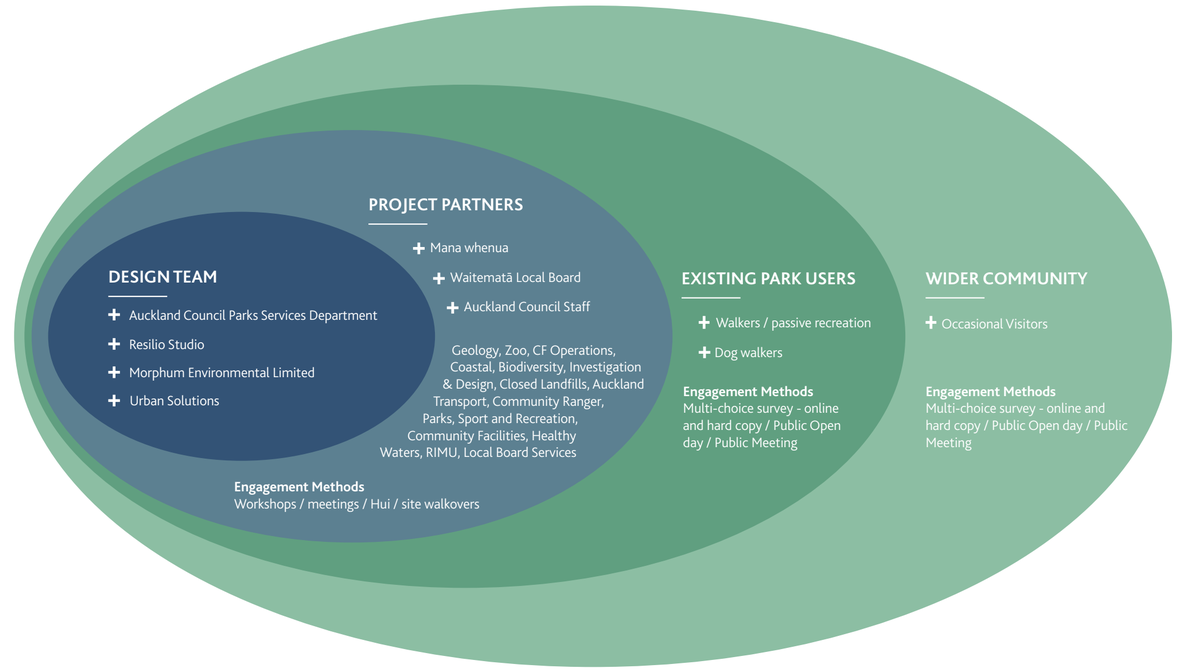
The second phase of consultation revealed that of those consulted:

- 26% use the park daily, 25% use the park weekly and 16% use the park fortnightly
- 50% walk or cycle to the park and 45% drive
- 60% use the park to exercise their dog off-leash while 30% use the park for non-dog related activities
- people were most satisfied with views of the coast and creek, open spaces, and tree plantings
- people were least satisfied with signage, rubbish bins, toilet facilities, gravel paths, and the car park.

For those consulted:

- The most important outcomes of the plan are:
  - controlling pest plants and animals
  - maintaining the 'wild' character
  - good paths for safe walking and running
  - protecting sensitive ecological areas
  - providing for coastal connectivity east and west of the site.
- The least important outcomes of the plan are:
  - small dog off-leash area
  - interpretation and signage
  - dog washing facilities.



IAP2's Public Participation Spectrum

1.4 Timeline

Development Plan timeline.

FEBRUARY 2017
Waitematā Local Board initiated Meola Reef Reserve Te Tokaroa Development Plan

MARCH 2017
Design consultants engaged

APRIL - MAY 2017
Phase One Consultation

AUGUST 2017
Phase Two Consultation

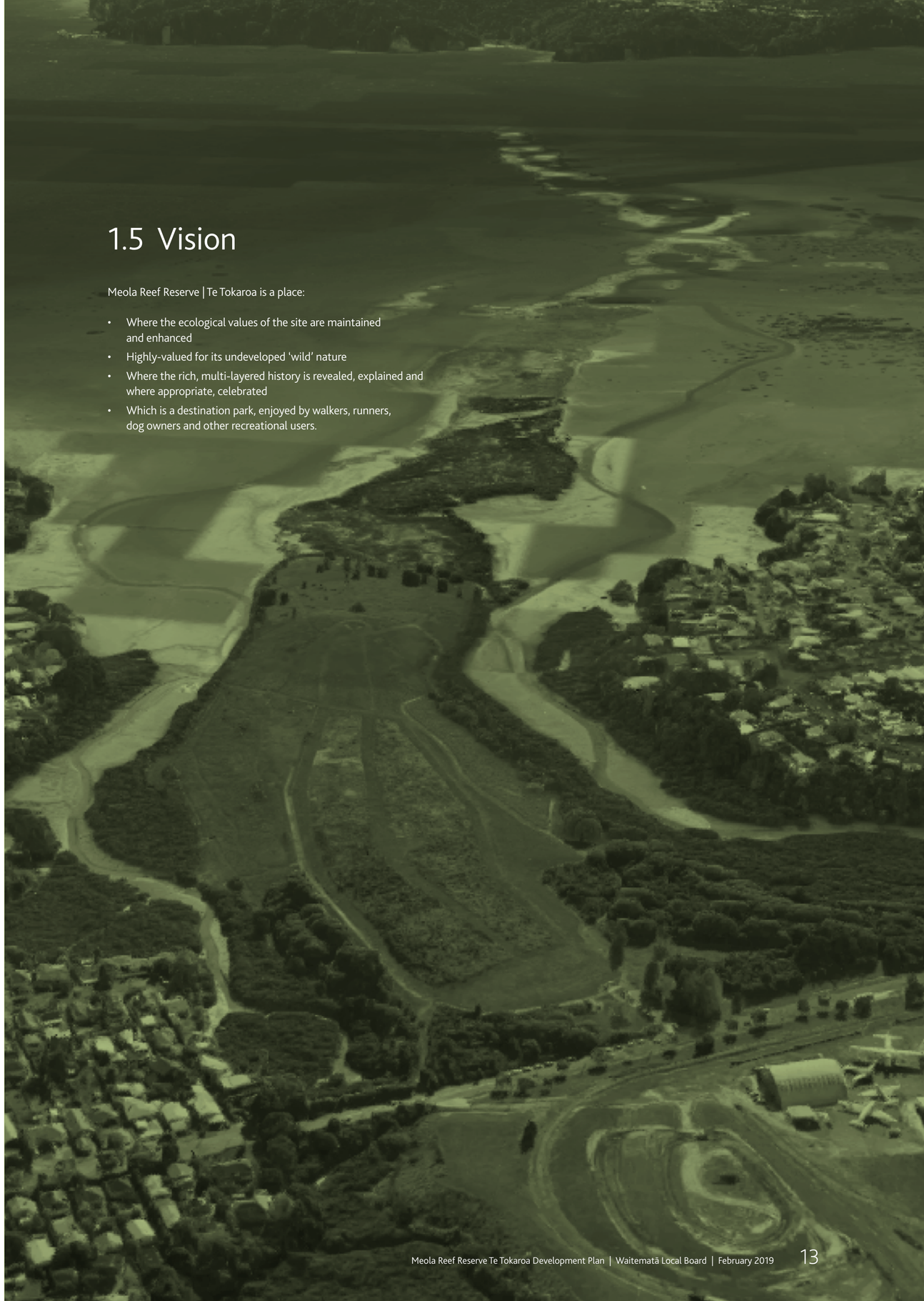
FEBRUARY 2018
Approval of the development plan

2019
Planning for delivery

1.5 Vision

Meola Reef Reserve | Te Tokaroa is a place:

- Where the ecological values of the site are maintained and enhanced
- Highly-valued for its undeveloped 'wild' nature
- Where the rich, multi-layered history is revealed, explained and where appropriate, celebrated
- Which is a destination park, enjoyed by walkers, runners, dog owners and other recreational users.



1.6 Design principles

Te Aranga design principles

The Auckland Design Manual (ADM)[2] notes that the key objective of the Te Aranga Māori Design Values and Principles is to enhance the protection, reinstatement, development and articulation of mana whenua cultural landscapes and to enable all of us (mana whenua, mataawaka, tauiwi and manuhiri) to connect with and to deepen our collective appreciation of 'sense of place'.[3]

- Rangatiratanga
- Kaitiakitanga
- Manaakitanga
- Wairuatanga
- Kotahitanga
- Whanaungatanga
- Matauranga

Mana whenua representatives have confirmed that Te Aranga Design Principles are a useful and desired initial framework to use to identify and explore opportunities for this project. During on-site conversations mana whenua have identified multiple opportunities that align with Te Aranga principles, most explicitly through the principles of Mana, Whakapapa, Taiao, Mauri Tū, Mahi Toi and Tohu. Multiple opportunities to enhance the mauri of the site and immediate environments were identified and discussed.

Through further engagement, co-design processes and detailed discussion with mana whenua, the range of opportunities identified can be prioritised and refined and the details of how Te Aranga Design Principles will be specifically applied to this project will be developed.

Site design principles

The following design principles and considerations are intended to supplement the Te Aranga Design Principles:

Connectivity

Meola Reef forms part of a wider network of walkways and cycleways.

Accessibility

Meola Reef is accessible to as wide a user group as possible, including children and people with disabilities*.

Safety

Meola Reef provides a safe network of paths with clear sight lines and multiple routes.

Viability

The plan provides value for money outlining a wide range of realistic projects with multiple pathways for implementation.

Resilience and adaptation

The plan has strategies in place to adapt to the effects of climate change, particularly sea level rise.

Engagement

Meola Reef provides places for community and cultural activation.

Stewardship

Local residents and community groups are encouraged to lead park-wide initiatives including but not limited to community planting groups, off-leash dog area ambassador group, etc.

* It is important to note that the ongoing settlement of the underlying landfill means that while accessible paths are desirable, they may not always be achievable.

Mana rangatiratanga - Authority

Outcome
The status of iwi and hapu as mana whenua is recognised and respected.

Attributes
- Recognises Te Tirit o Waitangi and the Wai 262 Ko Aotearoa Tenei framework for the Treaty Partnerships in the 21st Century Aotearoa New Zealand as the basis for all relationships pertaining development.
- Provides a platform for working relationships where mana whenua values, world views, tikanga, cultural narratives and visual identity can be appropriately expressed in the design environment.
- High quality Treaty based relationships are fundamental to the application of the other Te Aranga principles.

Whakapapa - Names and naming

Outcome
Maori names are celebrated.

Attributes
- Recognises and celebrates the significance of mana whenua ancestral names.
- Recognises ancestral names as entry points for exploring and honouring tūpuna, historical narratives and customary practises associated with development sites and their ability to enhance sense of place connections.

Taiao - The natural environment

Outcome
The natural environment is protected, restored and / or enhanced.

Attributes
- Sustains and enhances the natural environment.
- Local flora and fauna which are familiar and significant to mana whenua are key natural landscape elements within urban and / or modified areas.
- Natural environments are protected, restored or enhanced to levels where sustainable mana whenua harvesting is possible.

Mauri tū - Environmental health

Outcome
Environmental health is protected, maintained and / or enhanced.

Attributes
- The wider development area and all elements and developments within the site are considered on the basis of protecting, maintaining or enhancing mauri.
- The quality of wai, whenua, ngahere and air are actively monitored.
- Water, energy and material resources are conserved.
- Community wellbeing is enhanced.

Mahi toi - Creative expression

Outcome
Iwi/hapu narratives are captured and expressed creatively and appropriately.

Attributes
- Ancestral names, local tohu and Iwi narratives are creatively reinscribed into the design environment including: landscape; architecture; interior design and public art.
- Iwi / hapu mandated design professionals and artists are appropriately engaged in such processes.

Tohu - The wider cultural landscape

Outcome
Mana whenua significant sites and cultural landmarks are acknowledged.

Attributes
- Acknowledges a Māori world view of the wider significance of tohu / landmarks and their ability to inform the design of specific development sites.
- Supports a process whereby significant sites can be identified, managed, protected and enhanced.
- Celebrates local and wider unique cultural heritage and community characteristics that reinforce sense of place and identity.

Ahi kā - The living presence

Outcome
Iwi/hapu have a living and enduring presence and are secure and valued within their rohe.

Attributes
- Mana whenua live, work and play within their own rohe.
- Acknowledges the post Treaty of Waitangi settlement environment where iwi living presences can include customary, cultural and commercial dimensions.
- Living iwi/hapu presences and associated kaitiaki roles are resumed within urban areas.

1.7 History

Meola Reef Reserve Te Tokaroa has a rich, multi-layered history that can be understood as four distinct phases of development and change - geological, Māori, colonial and the more recent, post-landfill history.

Geological history

The irregular coastline, deep bays and broad sinuous estuaries of the Waitematā Harbour are typical of a drowned river system. One of the features of Auckland's geological history is the volcanic activity that has occurred throughout Auckland over the last 60,000 years. Meola Reef sits upon Auckland's longest lava flow at its interface with the Waitematā Harbour. Until 2008 it was believed the lava had flowed from Te Tātua-a-Riukiuta / Three Kings (28,500 years ago) and Maungawhau / Mount Eden (28,000 years ago) volcanos. However recent geochemical analyses has revealed that the foundation for the reef was laid by Te Kōpuke / Mt St John over 28,500 years ago, which was obscured by the later eruptions. The sea level was lower at the time of the eruptions than it is today and the lava flowed into forested river valleys. As it cooled, the molten lava contracted and formed into sets of vertical and hexagonal joints of basalt, creating the substrate for Meola Reef. As the sea level rose at the end of the last ice age, the hard surface of the lava flow would have supported diverse marine biota. Over time the accumulation of soft sediments in sheltered parts of the reef allowed the colonisation by saltmarsh plants and mangroves, which offered significant habitat for a wide range of wildlife, particularly marine birds.[4]

Maori history

According to Māori folklore, Te Tokaroa was formed when "one hapū of patupaiarehe (night dwelling fairy-like beings) fleeing from another warring hapū, hastily began building a rock causeway to cross the harbour to Te Raki Pae Whenua (the North Shore) and make their escape. In their preoccupation, they did not see the coming dawn and perished in the sun's light. Their skeletal remains formed the ridges of the reef."[5]

Te Tokaroa was also utilised as a land bridge. It was recognised as a challenging stretch of water to navigate and was a valuable mahinga kai site - for fishing, flax gathering and shellfish collecting. The area where the waters of Waititiko (Meola Creek) and Waiorea (Motions Creek) meet is known as Te Hononga o Ngā Wai, meaning the joining of the waters.

Colonial history

At the time of colonisation, Meola Reef was vegetated with the same or similar mix of saline wetland species it had for the last several millenia. The surrounding land was largely covered in manuka and scrub, with patches of exposed lava flow and rock forest.

The name 'Meola' is thought to have come from a glacier in India where Allan Kerr Taylor was born and lived until the age of eight. The Kerr Taylor family lived near the source of Meola Creek in Alberton House, a well-recognised historic home in Mount Albert.[6]

Around 1840 Felton Mathew, the surveyor to New Zealand's first governor, Governor Hobson, mapped the area now known as Point Chevalier into 25 to 70 acre blocks. At the time, there was a small Māori settlement on the eastern side of Point Chevalier overlooking Meola Reef, between what is now Johnstone and Oliver Roads.[7]

In 1861 the first pioneers settled in the area on land between Meola and Oakley Creeks and the few remaining Māori residents abandoned the area rapidly, leaving their canoes on the beach. It is believed that they joined forces with the Waikato resistance. Between 1859 - 1867 the area of land now known as Western Springs Park was converted into Auckland's military rifle range. In February of 1867 the rifle range was offered for lease at public auction, which was taken by William Motion at £20 per annum. The northern most 75 acres of the area, including Meola Reef, was gazetted in 1874 as a Lunatic Asylum Endowment Reserve and was leased to local farmers and used for quarrying. The Auckland Harbour Board quarried this area from 1873. From 1875, the largest land user in the area became Auckland City Council.[8]

Recent history

After 1900 the areas surrounding Meola Reef started to be built up with houses in place of the farms and factories that had been established by early settlers, and began to urbanise more rapidly with the spread of the electric tram network, piped water and other facilities. Access to the reef itself was limited until 1949 when Meola Road was completed, providing direct vehicle access to Meola Reef for the first time. In 1892 Grey Lynn Borough Council began tipping rubbish into gullies just off Garnet Road in what is now Jaggers Bush. In 1914 these dumps were inherited by Auckland City Council. The Meola and Motions landfill was established across a site that now encompasses Meola Reef Reserve Te Tokaroa, Western Springs School, MOTAT, and Seddon Fields. Landfilling across the site generally progressed from south to north from approximately 1930 and ceased in 1976. The Motions landfill south of Meola Road operated between 1930 and 1972. The Meola reef landfill north of Meola Road operated between 1961 and 1976.

In order to minimise pollution of the harbour only inorganic matter such as demolition materials was allowed in low-lying areas subject to inundation until the base was built up to 0.6m above Mean High Water Springs. Full-scale tipping on the reef began in 1965. As well as the typical waste products such as organic residential waste, building waste, roading asphalt, concrete, reinforcing, and car parts, more exotic items were also disposed of at Meola Reef including dead zoo animals and medical waste.

Before 1941 most of the land between the two estuaries (including the reef itself) was a Crown-owned Asylum Endowment Reserve. In 1941 its purpose was changed to Quarry Reserve and the Ministry of Works began quarrying and trucking the rock to a crushing plant located on the reef, from where it could be loaded directly onto barges. The crusher was closed and demolished in 1960, though the jetty was retained until 1984 – being used on and off for storing and working on barges and pontoons, breaking up small naval vessels, and also briefly for barging in beach shell. In 1963 7.11 hectares of the reef and 7.64 hectares of reclaimed land along the Meola and Motions creek estuaries was vested to council. In 1984 the remaining 2.65 hectares of land under Ministry of Works control was released to council and the reef came under council control as a reserve.

Continued on page 22 >

Waitematā Harbour, 1890s. Source Auckland City Libraries Heritage Images

Bird's eye view - 1965. Meola Reef Reserve Te Tokaroa viewed from the southeast, prior to landfill activites. Source Auckland City Libraries Heritage Images

Meola Reef Reserve Te Tokaroa 1940

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Meola Reef Reserve Te Tokaroa 1959

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Meola Reef Reserve Te Tokaroa 1968

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Meola Reef Reserve | Te Tokaroa 1996

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1.7 History continued

Landfill operations closed at Meola Reef in March 1976 and the remaining areas were soon covered in top-soil and grass and the reserve was opened up to the public in 1981 to "popularise it for passive recreational use". By this time the community was already engaged in restoring Meola Reef through a 200 metre deep strip of planting along the Meola Road frontage and some limited planting along the coastal edges, and in 1982 the Point Chevalier Community Committee planted 60 pōhutukawa and 30 cabbage trees. The uneven settlement of earth made mowing very difficult and because of the uncertainties of growing plants on top of the landfill the Council tried a range of species and planting methods. In 1983 it was decided to graze much of the reef as an interim measure until the landfill settled and the surface was evened out. Grazing continued on the reserve until 2000.

In 1987 the Grey Lynn-Westmere Community Committee adopted a vision for the reef as a unique space with ecological, archaeological and scenic values that demand its permanent protection from inappropriate development. The Friends of Meola Reef was established in direct response to another proposal for a harbour crossing on the reef. In 1993, the District Plan zoned the entire reef Recreation 1, emphasising its natural values and allowing for only minimal development. Project Meola was formed in 1997 and was active for five years, and Meola Eco-Care was also active from 1999-2004.

In 1995 Tonkin & Taylor investigated the state of 85 closed landfills across the isthmus, and identified 10 major sites needing priority remediation, including Meola Reef Reserve Te Tokaroa. The reef was remediated in three stages, starting with a leachate interceptor trench running parallel to Meola Road, followed by capping of 4.7 hectares in the centre of the landfill. Two large swaths running either side of the ridge in the southern half of the site were hydroseeded with grass and suitable small native trees and shrubs.

A reserve management plan for Meola Reef and several nearby park spaces in the Western Springs area was completed in 2002. Of particular note was the recognition by Te Hao o Ngāti Whātua that Te Tokoroa had special issues relating to its former use and development as a landfill site, that the land had been neglected and wounded, and that there was an obligation to rehabilitate the site and restore the mauri to the whole of the area.

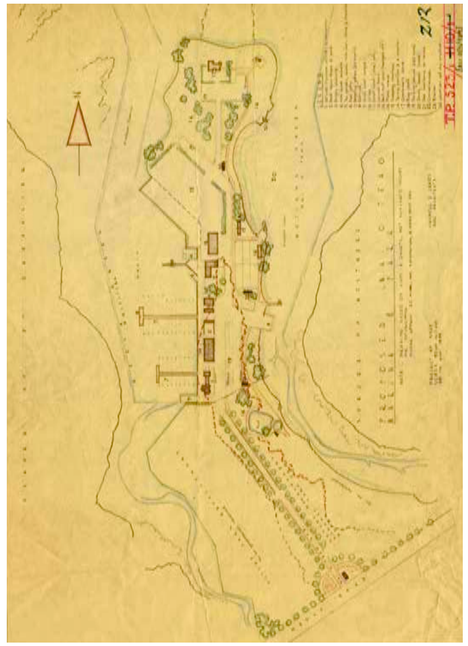
During that period there was also increased interest in Meola Reef Reserve Te Tokaroa becoming an inner city sanctuary for birds, and the exclusion of dogs. At the same time the Dog Owners Group (DOG) was forming to advocate for dogs to maintain access to the reserve. A decision was made to allow dogs to have on-leash access to the reserve and a 1 hectare fenced area was created for off-leash dogs. Since that time, the use of the reserve for dogs has increased steadily, but so have instances of people ignoring the on-leash dog rules. A number of park visitors use the entire reserve as an off-leash area for dogs. Over the same period community groups previously active in the reserve disbanded, partly because of the increasing number of dogs at the reserve.

By 2008 a number of small scale improvements had been made to the reserve, including a public toilet, a car park, larger formed paths, picnic tables on the northern end of the site and circular landform with seating on the prominent knoll overlooking the Waitematā Harbour. In 2009 a carving telling the story of Te Tokaroa was erected on Pt Chevalier's Coyle Park.

Design considerations

Despite Meola Reef's diverse geological, Māori and colonial past, and its use as a landfill site, there remains virtually no information revealing or informing users about the park and its history.

There is an opportunity to reveal, explain and where appropriate, celebrate the intrinsic value of that history. In its most basic manifestation, that could be achieved through interpretation signage. However the scope could be expanded to include interactive / spatial signage and/or place-based interpretive artworks.



There have been a range of suggestions and recommendations made for Meola Reef from as early as 1953. These have included a marine park, a national road safety training park, sports fields, various business activities such as a service station and boat building yard, a theme park, a harbour crossing, a landing ramp and holding paddocks for livestock from island estates in the Hauraki Gulf.

Meola Reef Reserve | Te Tokaroa 2016

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2 Site analysis

Part two - Site analysis

- Maps out the regional and local context of Meola Reef Reserve Te Tokaroa
- Presents an overview of site characteristics, including existing park users, assets, and the opportunities and constraints associated with the closed landfill
- Ecology and water quality status
- A summary of the sites constraints and opportunities.

2.1 Tāmaki Makaurau – regional context

Meola Reef Reserve Te Tokaroa sits on the southern shores of the Waitematā Harbour and the western boundary of the Waitematā Local Board area. The site is regionally significant for its geological formation, ecology and Māori history. The Te Tokaroa reef lava flow is an Outstanding Natural Feature in the Auckland Unitary Plan and the terrestrial and marine ecologies are both Significant Ecological areas. The history of the reserve as a landfill makes it a unique site. It is widely recognised as a significant off-leash dog area.

Design considerations

Recognise Meola Reef Reserve Te Tokoroa's unique contribution to Tāmaki Makaurau for its geology, ecology, Māori history and use as a space for off-leash dogs.

2.2 Waitematā – local context

Meola Reef Reserve Te Tokaroa forms part of a network of open spaces and complementary facilities that include Seddon Fields and Jaggers Bush Reserve, the Auckland Zoo, Western Springs, Western Springs Stadium, Pasadena Intermediate School and Western Springs College. The reserve is significant locally for its sense of wild nature and as a reserve for passive recreation, off-leash dog areas, coastal ecology and physical and visual links with the Waitematā Harbour and wider landscape.

Landscape ecology

Meola Reef forms part of the coastal ecology of Waitematā Harbour and the forest ecology associated with Meola and Motions Creek and the Western Springs network of parks and open spaces. Within that context, Meola Reef's unique geological history means it makes a special contribution to the broader coastal ecological network. Where the adjacent Point Chevalier and Westmere peninsulas support coastal cliff ecology, Meola Reef's low-lying landform supports a range of saline and marine habitats, including feeding grounds for wading birds.

At the time of writing there were no known community groups actively engaged in the maintenance and enhancement of the ecology at Meola Reef. However Auckland Zoo is establishing the 'Urban Ark' project, which includes an area encompassing Meola Reef and aims to "work with the local community to establish a network of green spaces, centred on the zoo, where plant and animal pests are controlled and which serve as working examples of urban wildlife conservation that inspire others."

Network connectivity

Meola Reef makes up part of a broader walking and cycling network that connects the open spaces and facilities in the Western Springs area and the adjacent suburbs of Point Chevalier and Westmere. However, the lack of footpaths, the frequency of buses, and according to some of the feedback received, limited parking, mean the reserve feels disconnected from the surrounding land uses.

At the time of writing, Auckland Transport had just completed consultation with the public regarding a separated cycle facility and footpath along the Meola Road frontage of the reserve. That is anticipated to improve local access to the reserve including road crossing facilities to improve direct physical connection to Seddon Fields. Facilities for cyclists such as bike stands and a drinking fountain at the main entrance could be provided.

Other opportunities identified during consultation to improve local connectivity and access to Meola Reef include installing and naming a bus stop on Meola Road at the entrance to Meola Reef Reserve Te Tokaroa, and to create connections across Meola and Motions Creek to provide direct access from the south.

Design considerations

- Maintain and enhance Meola Reef Reserve's natural landscape and ecological values plus those associated with its use as a space for off-leash-dogs and passive recreation, physical and visual links with the Waitematā Harbour and wider landscape and sense of 'wild nature'
- Where possible, improve access to Meola Reef and strengthen connections with wider transport and open space networks.

2.3 Site characteristics

The Meola Reef Reserve Te Tokaroa landform is shaped by the underlying landfill. From Meola Road, the land slopes up to a soft ridge and grassed plateau 12.5m above sea level which runs down the middle of the site, flattening off towards the north and meeting the underlying lava flow. The site is comprised of flat to rolling pasture with patches of regenerating forest and coastal vegetation.

A network of formed and unformed tracks is located around the edges and through the centre of the reserve. Large areas of the central ridge are mown, offering commanding views across Waitematā Harbour. Large areas of the side are slopes mown less frequently or which are typically left unmown. A small parking lot is located at the Meola Road entrance.

Meola Reef's separation from neighbouring properties and land uses by water and Meola Road contributes significantly to the community perception of the reserve as a 'wild' area and a place to experience nature. Key values for residents are proximity to water, views out across the harbour, sense of space, low-key development, green space, ease of access to significant ecological systems and an off-leash dog park. It was observed that most people coming to the reserve walk to the northern end of the reserve and back to experience the views, open space and connections to the wider landscape.

Vegetation is concentrated around the coastal margin, towards Meola Road, and in two large areas of planting either side of the ridge. Much of this planting was initiated by 'Project Meola', a community led initiative that is no longer active. Plantings include ngaio, kōuka, harakeke, manuka, pohutukawa, karaka, karo and karamu.

Design considerations

Maintain and enhance the existing character of Meola Reef Reserve Te Tokaroa.

Key

1. View looking south-east over the carpark towards MOTAT
2. View from the entrance of the park looking north
3. Looking along one of the bush tracks at the southern end of Meola Reef Reserve Te Tokaroa
4. View looking north at the intersection of the lower and upper paths on the eastern side of the reserve
5. Looking north along Motions Creek towards the Waitematā Harbour
6. View looking north over the saltmarsh and mangrove ecologies, towards the Harbour Bridge
7. Metal from the old landfill protruding at the north-western coastal edge of the reserve
8. Looking north-west over the mangrove ecology
9. View looking north-east over the open grassed picnic area at the northern end of the reserve
10. Viewshaft looking towards Ōwairaka, along the path on the highest 'ridge' in the centre of the reserve
11. Looking south in the off-leash dog park area
12. View looking west at Meola Creek












2.4 Park users

Current users

The current uses of Meola Reef Reserve Te Tokaroa are primarily dog walking and passive, informal recreation - walking, running, picnicking and experiencing the 'wild nature' of the site.

The off-leash dog area of the park is in high demand. Despite this, access is not immediate and/or obvious from the carpark and other entrances. The areas where people want to walk and take their dogs are outside the off-leash dog area. Many dog owners and users of the park do not abide by the rules of the park and for many park users the whole reserve is treated as an off-leash dog area.

Dogs impact the local environment in a number of ways, but most significant for Meola Reef is the disturbance of habitat for a wide range of birds and the affect their waste has on water quality. These activities create a conflict with the ecological values of the site and need to be managed.

There is limited access to the water's edge with no formal access points. Despite the fact that the water is of poor quality, some park users do access the water, particularly for their dogs to swim.

The landform and path surfacing is not ideal for visitors with restrictions to their mobility.

There is currently limited visual connection to Motions Creek.

Potential uses

The physical constraints of the site as a closed landfill, the sensitive coastal ecology, and the recognition of Meola Reef Reserve Te Tokaroa as one of Auckland's destination dog parks mean that there is limited need or opportunities to accommodate new uses. There are however a range of opportunities to enhance the existing uses for the site.

Design considerations

- Maintain and enhance the existing character of Meola Reef Reserve Te Tokaroa
- Explore strategies to resolve the conflict between dogs off-leash and the ecological values of Meola Reef Reserve Te Tokaroa. Strategies could include, but should not be limited to, a new location and arrangement of fenced off-leash dog areas, improved facilities and amenity for dogs and their owners, clearer signage and boundaries between different areas of the reserve, community engagement and fostering of shared decision making and ownership of the development, and monitoring and maintenance of the reserve
- Where possible, improve accessibility through Meola Reef Reserve Te Tokaroa
- Where possible, improve visual connection to Motions Creek via vegetation management.

Walkers / runners / passive recreation

Dog walkers

Birds, lizards and other local fauna

2.5 Community assets

Access and circulation

Car park for nine vehicles accessed off Meola Road. There is one accessible carpark. The carpark is relatively new and in good condition.

Public toilets

Public toilets with two cubicles next to carpark and visible from Meola Road. The toilets are relatively new and in good condition.

Path network

A varying network of formed and unformed paths ranging in width and condition. With a few exceptions, most of the path network is in need of an upgrade.

Signage

The existing signage includes an entrance sign immediately north of the carpark, enforcement notices regarding use of the off-leash dog area, and warning signs regarding the poor quality of Meola and Motions Creek water. The entry sign is the only interpretation sign at the reserve and includes a short description of the park's history.

Fencing

Fencing around the off-leash dog area was upgraded as recently as 2011 and is in good condition. The gates to the off-leash dog area and the fencing surrounding the large areas of vegetation along the ridge of reserve are in poor condition and need either replacing or removing.

Furniture

There is a small range of furnishings in the park associated with the off-leash dog area and passive recreation uses of the site. Drinking fountains, rubbish bins, traditional park benches and large solid timber picnic tables.

Meola Reef - existing layout

2.6 Closed landfill

The filling methodology used at Meola Reef Reserve Te Tokaroa included minimal surface preparation where fill was to be placed on top of the reef. Some surface preparation occurred where the landfill extended onto reclaimed land around the margins of the reef. The landfill was not lined.

Landfill waste included organic residential waste, building waste, roading asphalt, concrete, reinforcing, and car parts, and is of varying depth between 2m to 10m. The waste has not decomposed significantly. The fill was tipped and compacted on site into a series of level platforms to create a layered, yet heterogeneous, refuse profile. There is a considerable body of technical information available for the site, and overall it is considered that environmental conditions are well understood. The information from sampling undertaken during the current monitoring period indicates that discharges from the site are stable.[14]

While there are no immediate risks associated with the site, there are significant constraints associated with the landfill[15] and any development of the reserve will need to be sensitive to the risks and operational requirements of the closed landfill. This includes public health and safety risks and environmental risks and the access and management of landfill content. Further capital works on the closed landfill are planned between 2021 and 2024 and will likely involve protection of the waste from erosion, re-contouring to minimise storm water infiltration, and augmenting the cap.

Cap and cover

Remediation capping was undertaken in 2001-2002 over approximately 4.7ha to limit the amount of leachate generated by rainwater seeping into the landfill, while leaving most of the trees in place along the edges. Once completed the surface was covered in topsoil and hydroseeded.

The thickness of the cover varies across the site ranging between 0.1m and 1m thickness with little to no cap at the margins with Meola and Motions creeks. The cover material has a relatively high permeability meaning that a high percentage of the rain falling on the site is likely to percolate through the cover materials and refuse, contributing to the volumes of leachate entering adjacent water bodies. Soil samples collected from cover materials indicate that the cover does not present a risk to human health and is considered to be suitable for continued recreational land use activities.[19] The leachate volumes from the site are significantly influenced by groundwater movement through the basalt lava flow and cap improvements are not anticipated to make a significant difference in the volume and quality of leachate.[16]

Leachate

Leachate at Meola Reef is primarily generated through the upwelling and through flow of groundwater from the underlying basalt aquifer. It is also generated when rainfall infiltrates the capping material and passes through the refuse. A 0.4m wide and 180m long leachate interceptor trench running parallel to Meola Road was constructed at the reserve in 2000. The trench is intended to divert local leachate and groundwater from west to east where it is ultimately pumped and discharged to the reticulated wastewater network. However it is not currently performing as designed and it is thought that the underlying geological conditions are allowing leachate flows to bypass the collection trench so that leachate can discharge directly to the receiving environment. The impact of leachate discharges on the adjacent Motions and Meola creeks and the Waitematā Harbour has not been evaluated comprehensively, however individual studies that have been carried out indicate that the recorded concentrations of contaminants are indicative of an aged and dilute leachate. This discharge will have an immediate localised adverse effect on the receiving environment.[17]

Importantly however, analytical results collected from the receiving environment indicate that the current quality of the water in the surrounding area is so poor that any leachate from the closed landfill is having no discernible adverse effect on water quality within the wider receiving environment. The above aside, areas of iron precipitate 'staining' surface water are considered to have an aesthetic impact on park users.[18]

Gas release

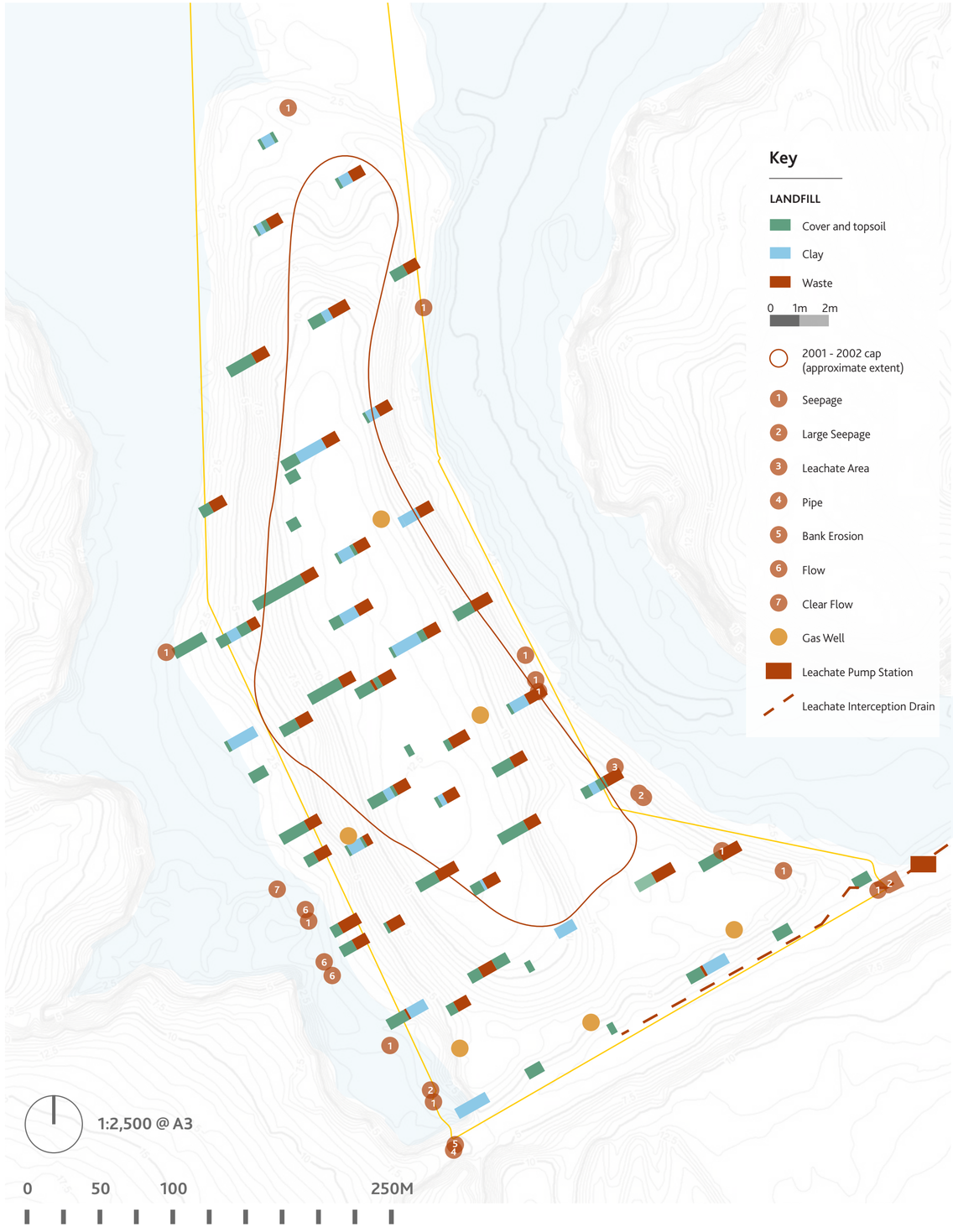
Landfill gas is present at the site in concentrations typical of a landfill of this age. At the present time, landfill gas is able to safely vent through the cover material. During development works at the site, safe management of landfill gas risk will be an important consideration and must be taken into account in the design of any structures or subsurface infrastructure.[19]

Design considerations

The landfill is a significant constraint to the site and approval for any development, remediation and/or maintenance works which may impact on the cap or other closed landfill associated infrastructure must be obtained from the closed landfill asset manager before they are commenced. In particular, the cap and cover is a significant constraint for water sensitive design[20] solutions and the establishment of vegetation including specimen trees and revegetation. If and when the roots penetrate the cover and enter the landfill content there is an increased likelihood that leachate and landfill gas will compromise the health of the plant. An unhealthy plant is more vulnerable to disturbance through windfall or flooding. Should this occur there is a risk that fallen trees will expose the underlying refuse, which could in turn present a risk to park users.

Continued settlement of the landfill material also restricts the type of path surfaces possible. Path surfacing that is too rigid, such as concrete, is likely to crack and break over time if and when the underlying materials shift. This means that creating a durable and long lasting surface accessible to people of all ages and abilities will be difficult to achieve without consistent and ongoing maintenance. As such, any path surfacing will need to balance the needs for an accessible surface with the ongoing maintenance requirements of that path.

Meola Reef - leachate and gas emissions



2.7 Water quality

Meola Reef Reserve Te Tokaroa is located on Auckland's longest lava flow between Meola and Motions creeks. The Meola creek catchment has a total area of approximately 1555 hectares, accounting for approximately 10 per cent of the total isthmus area. The Motions catchment has a total area of 544 hectares and is largely piped with relatively short lengths of open water through Western Springs and channelised sections through the Auckland Zoo.

The State of Auckland Freshwater Report Cards provide a reference guide for the overall quality of the water for an area of the city across the criteria of water quality, flow patterns, nutrient cycling, habitat quality and biodiversity. The report card for the Albert-Eden Roskill area, which includes Meola Creek, received an overall grade of 'E', where A is the highest achievement and F is the lowest.[24] It is understood that of the base flow of Meola Creek, approximately 30 per cent is ground water, 40 per cent is runoff and 30 per cent is combined sewer overflow.[25] The report card for the Waitematā Local Board area, which includes Motions Creek received an overall grade of 'D'.[26] As the permanent warning signs at Meola Reef Reserve Te Tokaroa indicate, the water quality in Meola and Motions creeks is poor and the water is not safe to swim in, fish or collect shellfish from. There have also been several anecdotal reports of dogs becoming sick from swimming in the water.

There are a number of causes affecting the water quality in Meola and Motions creeks, in particular the stormwater runoff from impervious surfaces such as roads and carparks and the combined sewer outfalls. As noted above, while the leachate emerging from the Meola Reef Reserve Te Tokaroa landfill is likely to have immediate localised adverse environmental effects, the current water quality of Meola and Motions creeks is so poor that the leachate is unlikely to be having a discernable adverse effect on water quality within the wider receiving environment. As a result of the stormwater runoff from impervious surfaces, the sediments in both of the creeks have elevated concentrations of heavy metals including lead and zinc.[27]

The residential areas in the Meola and Motions Creek catchment have a combined sewage and stormwater system, which is designed to transport wastewater and stormwater in the same pipe. This system is often unable to cope with large volumes of stormwater after periods of heavy rainfall. As a result, the overflow pipes discharge diluted wastewater into waterways and onto foreshore areas during heavy rainfall events. In order to address this issue, Watercare is proposing to implement the Central Interceptor - a 13 kilometre tunnel between Western Springs and the Mangere Wastewater Treatment Plant. The Central Interceptor is expected to reduce the annual average overflow volume by 80 per cent. Construction is estimated to start in 2019, and until that time, the options to address issues of wastewater entering the stormwater system are significantly limited.[28]

Overland flows

As noted above, the permeability of the landfill cap and cover is a significant constraint for water sensitive design solutions. In addition, dog waste, if not properly managed, can also have a detrimental affect on water quality when it is transported into water bodies.

Design considerations

In order to reduce the amount of water percolating into the landfill, it may be desirable to line the surface of overland flow paths and areas that pond with a low permeability material such as clay before planting with the appropriate water tolerant plants.

The best strategies for reducing the risk of dog waste entering waterways are behavioural, and relying on all dog owners to take responsibility for the waste their dogs produce on site. In addition to behavioural strategies, the design and layout of the off-leash dog area can also reduce the risk. Methods include ensuring the areas accessed by dogs are physically removed from overland flow paths and water bodies, and overland flow of any water leaving the area moves through a vegetative buffer so that nutrients associated with the waste are slowed, captured and taken up by the vegetation.

Where possible, and within the constraints of the site, seek to manage overland flow paths with water sensitive devices such as bioretention planting.

Healthy Waters and Watercare have responsibility for the water quality as a result of stormwater and combined wastewater overflows. As the causes underpinning the water quality are systemic and catchment wide, there are no easy solutions to address the issue of water quality in either Meola and Motions creeks within Meola Reef Reserve Te Tokaroa. Addressing the systemic, catchment wide issues of water quality in the Meola and Motions Creek Catchment is outside of the scope of this development plan.

2.8 Ecology – environment

The Meola Reef Reserve Te Tokaroa is scheduled as a terrestrial Significant Ecological Area (SEA) under the Auckland Unitary Plan, Operative in Part (AUP:OP), meeting two criteria: threat status, rarity and stepping stones, migration pathways and buffers. Meola Reef Reserve Te Tokaroa is boarded by four marine SEAs, two of which are listed as significant wading bird habitat. Te Tokoroa Reef system provides a range of habitats and flora and fauna which is unique both within the Waitematā Harbour and throughout New Zealand, and nationally recognised as a rare ecosystem type.
The hard surface presented by the lava flow is unusual within the Waitematā Harbour and the diverse marine biota it supports, particularly sponges and bryozoans, is correspondingly unusual.
The reef and tidal mudflats, also to the north of the reserve, is a significant area for wading birds. There are extensive salt marshes and mangrove communities associated with the reef and creeks to the east and west of the reserve.

Flora - Existing vegetation

The main vegetation types on Meola Reef Reserve Te Tokaroa are made up of eight broad plant communities.

Mown grass
Approximately 24 per cent of the reserve is mown grass.

Rank grass
Approximately 20 per cent of the reserve is rank grass that is not regularly mowed.

Coastal mixed broadleaf forest
Relatively large areas of coastal forest are located in the southwest and southeast corners of the site. The plantings are approximately 15-20 years old and are of relatively low diversity. Species include pohutukawa, totara, ngaio, kawakawa, karo, karamu, tī kōuka, and manuka, with occasional karaka and kowhai. Bindweed is common in the eastern block.

Revegetation planting
Two blocks of low diversity revegetation planting are located along either side of the ridge running north south through the site. The plantings are approximately 5-8 years old and are of low diversity. Species include tī kōuka, karamu, manuka, and harakeke.

Coastal scrub
A narrow margin of coastal scrub has been planted along the edge of the reserve including karo, tī kōuka, oioi, ribbonwood, bolboschoenus, and harakeke.

Salt marsh
Small pockets of glasswort and other salt tolerant herbs and rushes were common along the coast between mangroves and coastal scrub. Today, the most extensive areas are located along the northern edge of the reserve across the basaltic lava field.

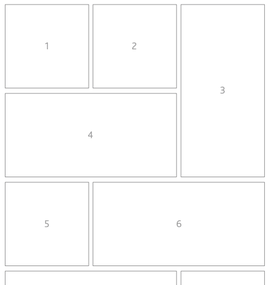
Mangroves
The reserve is flanked by Motions and Meola Creeks which are bordered by mangrove forest.

Exotic
Several small areas of established exotic vegetation have been planted within the reserve and include queensland box, camphor laurel, olive, yucca, Chinese windmill palm, and a peach tree.

Millenium Forest
The Millenium Forest was planted by local school children under the direction of Project Meola in 1999-2000. It is located northeast of the car park running more or less parallel with Meola Road.

Key

1. Mown grass
2. Coastal scrub
3. Rank grass
4. Coastal mixed broadleaf forest
5. Revegetation planting
6. Salt marsh
7. Mangroves
8. Exotic



2.8 Ecology – environment continued

Fauna - Birds, insects and reptiles

Birds | Avifauna

Areas surrounding Meola Reef Reserve Te Tokaroa are noted for their value as feeding, roosting, and breeding habitat for coastal and wading birds. Species observed in the saline vegetation and along the reef are white-faced heron, welcome swallow, South Island pied oystercatcher and pied stilt, with the Australasian harrier hawk, and starling observed above the grassland. Blackbirds are present in the larger planted areas, and sparrows in the mangroves. In 2012, 11 species were recorded in an on-site survey and New Zealand eBird, a citizen science platform has recorded 48 species between 2009 and 2017, including six nationally threatened species and seven at risk species. Two New Zealand dotterels pairs were observed in established territories in the revegetation planting in 2007 (Te Ngahere). Further investigation is recommended to assess the current value of the site as dotterel breeding grounds. Further consideration should also be given to the suitability of the site for potential habitat enhancement and risk of creating a population sink due to ongoing potential impacts associated with dog control at the reserve.

Any clearance or management of existing vegetation risks adverse impacts on birds including mortality of any juveniles or eggs in the area. It is recommended that vegetation clearance, if any, should not occur during breeding season - September to December inclusive.

See Appendix A for complete list of bird species.

Lizards | Herpetofauna
All native herpetofauna or lizard species are protected under the Wildlife Act 1953 and it is an offence to disturb or kill native lizards without a Wildlife Act Authority issued by the Department of Conservation. The habitat currently present at Meola Reef Reserve has the potential to support a range of lizard species. Rank grass is a preferred habitat type for copper and ornate skinks and the site may potentially support abundant populations of these species (EcoGecko, 2017). As a coastal site, it is also possible that moko or shore skinks may be present (EcoGecko, 2017). Forest and elegant geckos have occasionally been recorded within mangrove habitat and these species may be present within coastal vegetation. Clearance or disturbance of rank grassland, thick vegetation, and leaf litter or other ground cover may result in a loss of habitat or direct injury to lizards.

See Appendix B for complete list of lizard species.

Dogs | Canis familiaris
As noted above, dogs impact the local environment in a number of ways, but most significant for Meola Reef is their disturbance of the habitat, feeding and breeding grounds of a wide range of birds and the affect their waste has on water quality.

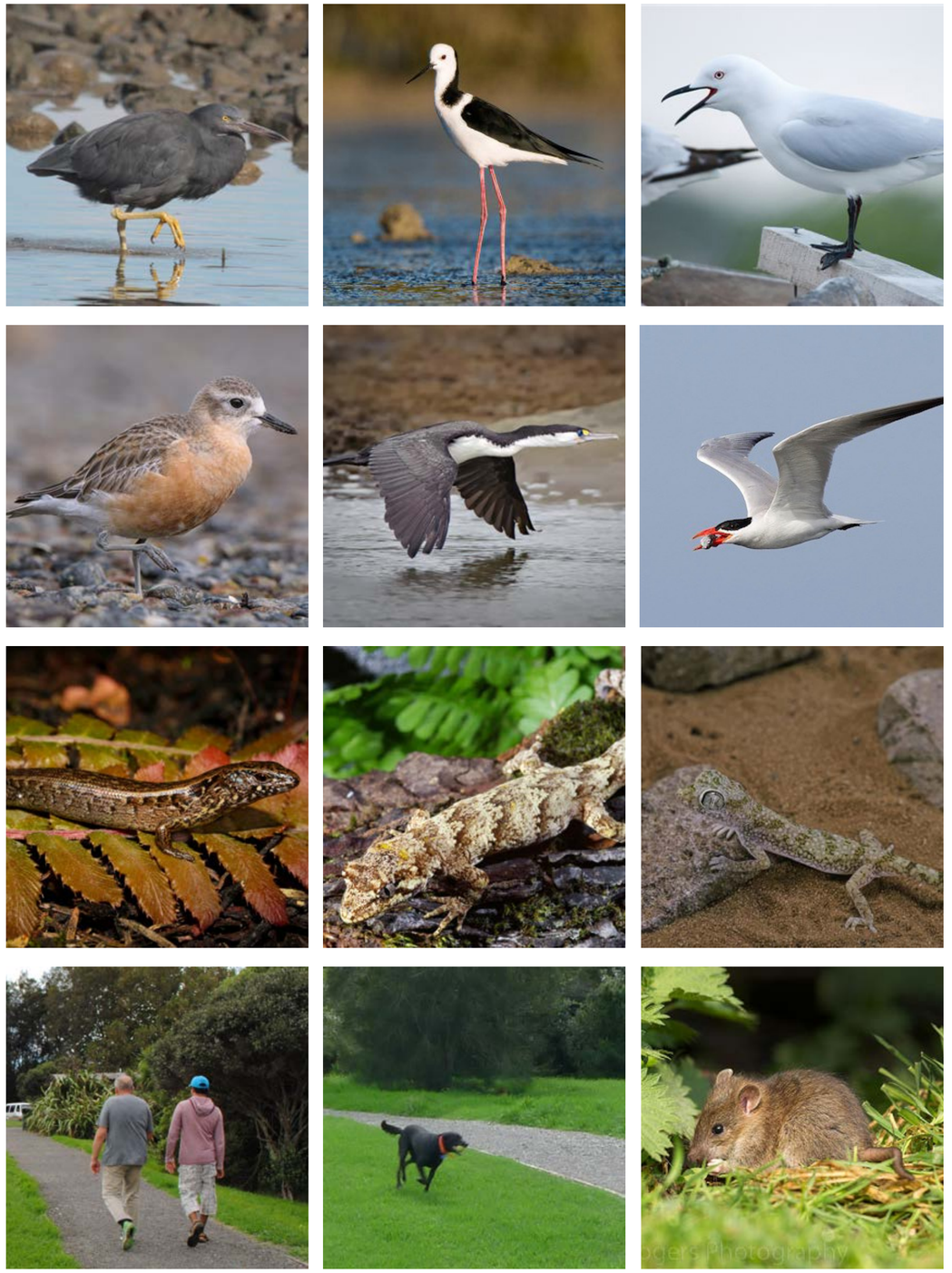
Mammals | Rats and other pests
No information was available regarding the potential diversity and abundance of animal pests present at Meola Reef Reserve. Feedback was received during consultation that there are rats on the site and there are likely other mammals present within the reserve including possums, mice, rabbits, feral cats, and mustelids.

It is recommended that an animal pest control programme is developed and implemented to support the ecological restoration objectives for the site. This may be coordinated with existing initiatives such as the Auckland Zoo's Urban Ark project, which aims to reduce pest incursions to the zoo through supporting off-site control, at Meola Reef Reserve.

As one of the uses of Meola Reef Reserve Te Tokaroa is for off-leash dogs, animal pest control programmes should consider the risk of secondary poisoning in evaluating the suitability of poison baiting. For this reason, the use of traps, with the appropriate safeguards to prevent injury to non-target species such as dogs, is preferable.

Key

1. Reef heron - Nationally Endangered (risk of extinction)
2. Pied stilt - At Risk - Declining
3. Black-billed gull - Nationally Critical (immediate risk of extinction)
4. NZ Dotterel - Nationally Vulnerable (risk of extinction)
5. Pied shag - Nationally Vulnerable (risk of extinction)
6. Caspian Tern - Nationally Vulnerable (risk of extinction)
7. Ornate skink - At Risk - Declining
8. Forest gecko - At Risk - Declining
9. Elegant gecko - At Risk - Declining
10. People
11. Dogs
12. Rats



2.8 Ecology – environment continued

Climate change impacts

Large low-lying areas along the northern edge of the park will become increasingly inundated overtime and shift from a freshwater coastal environment toward a saline environment.

Revegetation opportunities

There is an opportunity to increase overall biodiversity values of the Meola Reef Reserve by expanding the extent and diversity of saltmarsh communities and the coastal broadleaf forest.

Saltmarsh communities
There is an opportunity to expand saltmarsh communities on the landward edge of the reserve, in conjunction with management of the edge of the landfill and other low-lying areas.

Saltmarsh communities are a type of wetland occupying the intertidal to supratidal zone and inland, just above mean high water tide. Herb fields usually develop on rocky outcrops subjected to salt spray and coastal winds (Singers et al. 2017). These ecosystem types occupy a small narrow niche on the coastal and estuarine margin of the site, which has been reduced through erosion caused primarily by people, dogs and historically by stock and displacement by other vegetation types such as mangroves.

Restoration and enhancement of saltmarsh communities in NZ is still an area of research in its infancy, and consequently may be challenging to achieve. As an already degraded area, the edge of the landfill may provide a unique opportunity for experimental trials to be conducted to inform restoration work elsewhere in Auckland. It is recommended that a more detailed survey of the assemblage and distribution of existing saltmarsh and herbfield communities present at Meola Reef Reserve Te Tokaroa is undertaken to guide bank grading and appropriate topography and planting zonation for restoration of these areas.

Coastal broadleaf forest
There is an opportunity to increase extent and diversity of existing coastal vegetation and riparian corridor for roosting and feeding resource for native lizards and birds along the perimeter of the reserve.

The coastal broadleaf forest should create conditions where native plants can regenerate themselves, so that eventually the planting can become self-sustaining like a natural forest. Initial plantings include hardy trees and shrubs that can cope with exposed conditions and provide suitable coloniser (or nurse) vegetation for forest trees that are unsuitable for planting directly into a bare site. These secondary plantings can be allowed to establish naturally or planted later in order to encourage a more diverse forest to develop.

It is recommended that the width of the riparian corridor should be a minimum of 20 metres to reduce edge effects and the likelihood of weed infestation resulting in self-sustaining, low maintenance native vegetation.[26]

Design considerations

- Balance the needs of different user groups and manage access across the site, particularly to sensitive ecological areas
- Formalise public access to the coastal marine area
- Provide interpretation signage revealing and explaining the ecology of Meola Reef and the risks to that ecology of off-leash dogs
- Develop strategies to adapt to the ongoing effects of climate change and sea level rise on the use and ecology of the reserve
- Ensure that any and all vegetation clearance considers the risk of disturbing habitat for birds and lizards
- Develop strategies for planting on site that will reduce and if possible, eliminate the risk of roots penetrating into refuse
- Continue weed management
- Further research the possible value of the Meola Reef as a dotterel breeding ground.

2.9 Challenges and constraints

Scope

The issues of the ongoing management of the closed landfill and the water quality of Meola and Motions creeks are significant systemic issues that are outside of the scope of this development plan.

Closed landfill

The landfill and cover is a significant constraint to:

- Water sensitive design solutions
- The establishment of large vegetation including specimen trees and revegetation
- Creating a durable surface accessible to people of all ages and abilities
- Iron precipitate 'staining' surface water.

Access

Limited access across Meola Road, the lack of footpaths, the frequency of buses, and, according to some of the feedback received, limited parking, mean the reserve is disconnected from the surrounding land uses.

Needs of different users

There is a conflict with users of the park, particularly dogs and their owners wanting access to parts of the reserve that are, or will be in the future, suitable for enhancement of ecological values of the site, particularly habitat, feeding and breeding grounds of a wide range of birds and lizards.

Water quality

The permeability of the landfill cap and cover is a significant constraint for water sensitive design solutions and dog waste, if not properly managed, can also have a detrimental affect on water quality when it is transported into water bodies.

Ecology | Environment

In addition to the challenges of the closed landfill, there is ongoing ecological pressure from competitive exotic plant species and animal pests.

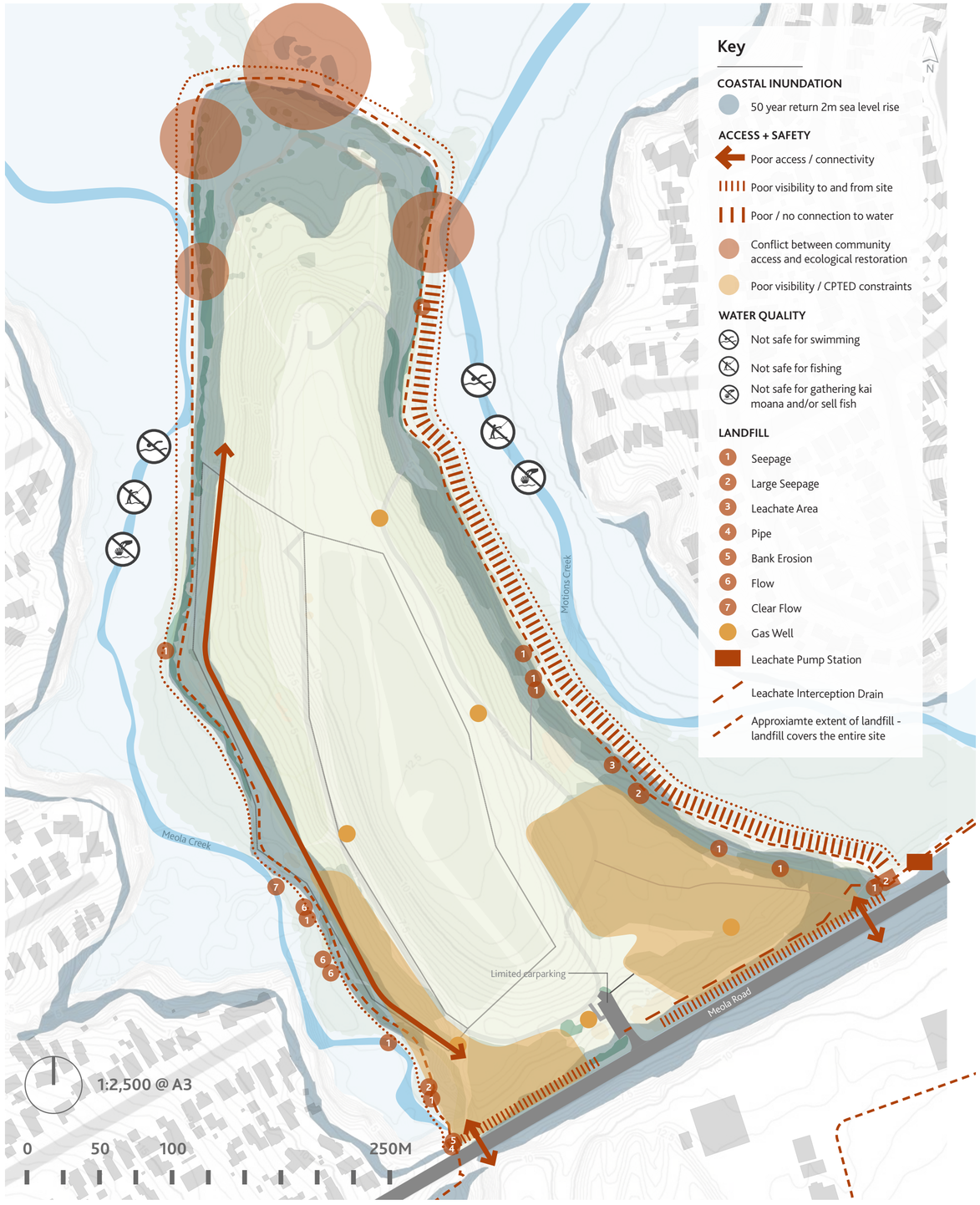
Consenting

All structures on the foreshore need to be consented or removed.

Climate change impacts

Large low-lying areas along the northern edge of the park will become increasingly inundated over time and shift from a freshwater coastal environment toward a saline environment.

Meola Reef - challenges and constraints



2.10 Opportunities

Te Aranga design prinicples

Where appropriate, develop 'place based applications' of Te Aranga Design Principles with mana whenua.

History

Reveal, explain and where appropriate, celebrate the intrinsic value of the diverse geological, Māori and colonial history of the site as well as the use as a landfill. In its most basic manifestation, this could be achieved through interpretation signage however this brief could be expanded to include interactive / spatial signage and/or place based interpretive artworks.

Ecology, recreation, dogs and their owners

Maintain and enhance the existing ecological values of Meola Reef Reserve Te Tokaroa as well as the dog park facilities and passive recreation opportunities.

Access and connectivity

- Rationalise and enhance the existing path network
- Improve access to Meola Reef and strengthen connections with wider transport and open space network
- Allow for future expansion of existing carpark if required.

Existing character

Maintain the sense of remoteness and 'wild nature' of Meola Reef Reserve Te Tokaroa.

Signage

Provide new wayfinding signage at key points throughout the reserve including the entrance sign.

Community assets

Maintain and enhance furniture including picnic tables, bench seating, drinking fountains, community notice board, and potentially barbeques.

Revegetation and wildlife habitat

Increase overall biodiversity values of the Meola Reef Reserve Te Tokaroa by expanding the extent and diversity of saltmarsh communities and the coastal broadleaf forest.

Meola Reef - opportunities

3 Development plan

Part three - Development plan

Development plan presents and explains the design through a series of plans and diagrams and outlines strategies for different user groups, both human and non-human, planting, path surfaces and the 'kit of parts' - seating, fencing, gates etc.

3.1 Design overview

The design for Meola Reef Reserve Te Tokaroa seeks to balance the different needs and desires of the different park users, both human and non-human by organising the site into three concentric forms. In particular, the wildlife and associated habitat - salt marsh ecology, coastal broadleaf forest, birds, lizards and insects; people visiting the park for walking, running, picnicking and experiencing the 'wild nature' of the site; and dogs and their owners. These three basic functions can be simplified to 'Birds, People, and Dogs and Their Owners'. The area for birds, which excludes dogs completely and discourages people from entering sensitive ecological areas occupies 25 per cent of the land area of Meola Reef Reserve Te Tokaroa. The area for people and dogs on-leash occupies 50 per cent of the site and 25 per cent is for off-leash dogs and their owners.

Birds

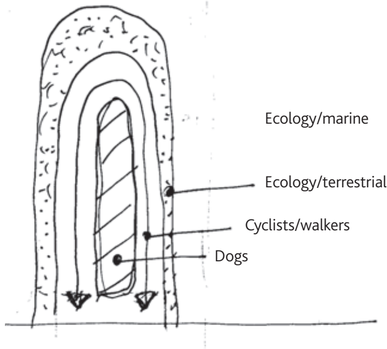
The riparian margins and the northern end of the reserve are dedicated to the maintenance and enhancement of the ecological values of the site and surrounding environs. The riparian corridors along Meola and Motions creeks are planted to increase their width and effectiveness as a wildlife corridor. Careful consideration is given to the edge of this planting to ensure sightlines are maintained for the primary path network. The northern end of the reserve is fenced off to create a no dog area for birds and other wildlife, picnic areas and to allow for the long term colonisation of saline vegetation of the area. Large areas of the northern headland are bound by an extensive boardwalk and viewing platforms which also forms the extent of the area accessible to people and helps to protect sensitive ecological areas. It is important to note that all planting on Meola Reef carefully considers the challenges and constraints associated with the cap and cover - see planting strategy below for more information.

People

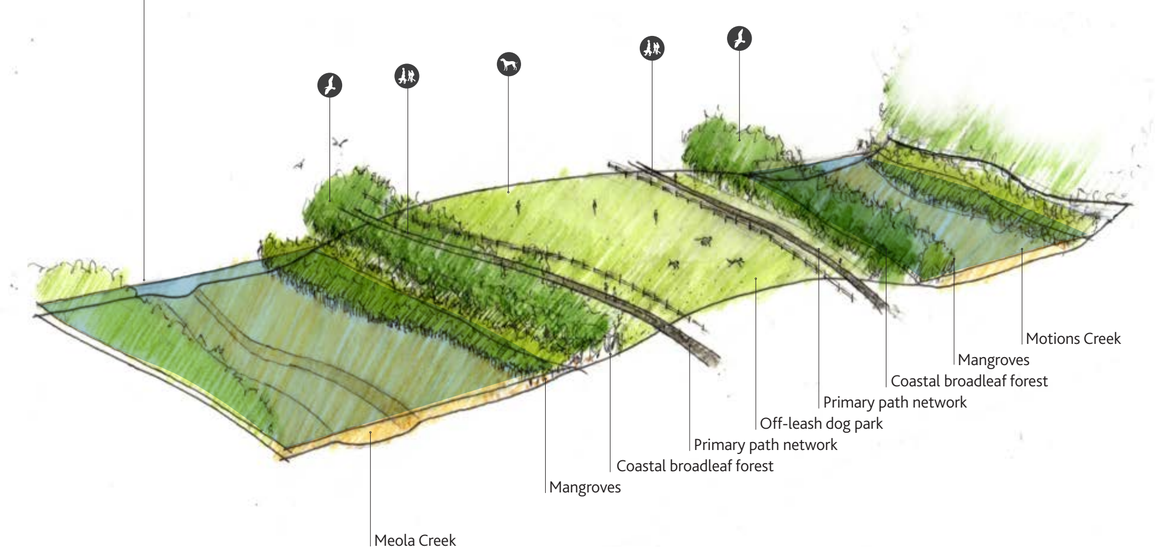
Surrounding the off-leash dog area is the the primary path network for Meola Reef and the on-leash dog area of the reserve. The path network runs along a similar alignment to the existing path on the eastern side of the reserve and the western path is shifted to accommodate the new location of the off-leash dog area. At the entry to the park, people are provided with a choice to either enter the off-leash dog area or the on-leash area. In order to encourage people to make a conscious decision about what area of the park they would like to use, both spaces have gates with explanatory signs outlining the expected use of the park.

Dogs and their owners

The existing fenced area for off-leash dogs and their owners is enlarged and relocated to the primary ridge running through the middle of the reserve. Potentially a separate space for small dogs could be provided. The fenced area extends onto the main ridge so that dog owners can experience the expansive views across the Waitematā Harbour. The entry to the off-leash area is relocated to be adjacent to the existing carpark and a new entry path for pedestrians is created to integrate into a proposed cycleway and footpath. New improved facilities are provided for dog owners including compostable dog waste bag dispensers and/or shared community bag baskets and waste receptacles.



Original concept sketch



Top Diagram demonstrating organisation of Meola Reef Reserve Te Tokaroa. **Bottom** Axometric diagram demonstrating typical arrangement of Meola Reef Reserve Te Tokaroa.

3.2 Master plan

The illustrative master plan opposite provides an overview of the design and layout for Meola Reef Reserve Te Tokaroa. It includes all areas of vegetation, existing and proposed path networks, the location and management of the off-leash dog area, as well as an indication of different types and locations of furniture and infrastructure.

Meola Reef - master plan

Key

ACTIVITY AREAS

- Protected ecology
- People + ecology (no dogs)
- Mixed recreation (dogs on-leash)
- Dogs off-leash

VEGETATION

- Mown grass
- Rank grass
- Existing coastal forest
- Proposed coastal forest
- Salt marsh

PATHS + ACCESS

- 2-3m bound gravel
- 2-3m timber boardwalk
- 1m bound gravel
- 1m mown path
- Timber deck / platform over water

FURNITURE + INFRASTRUCTURE

- Wire mesh fence
- Gate
- Picnic + BBQ area
- Bench seat
- Interpretation sign
- Wayfinding signage
- Public toilet
- Drinking fountain
- Bike facilities
- Carpark
- Opportunity to expand car park See page 63 for more information

OFF-LEASH DOG AREA

- Fenced off-leash small dog area
- Dog facilities including waste bin, bag dispenser, washing facilities etc

TE ARANGA DESIGN PRINCIPLES
***To be confirmed**

- Mana - Rangatiratanga Authority
- Whakapapa - Names & Naming
- Tohu - Wider Cultural Landscape
- Taiao - Natural Environment
- Mauri Tu - Environmental Health
- Mahi Toi - Creative Expression
- Ahi Kā - Living Presence

3.3 Artist impressions

Before View from ridge looking across Waitematā Harbour.

After Artist impression of expanded off-leash dog area looking across Waitematā Harbour.

Before View from low lying grass area at the north of the reserve looking across Waitematā Harbour.

After Artist impression of upgraded path network, water viewing platform, picnic area and planted salt marsh ecology looking across Waitematā Harbour.

3.4 Designing for birds

Biodiversity and landscape ecology

Increase overall biodiversity values of the Meola Reef Reserve Te Tokaroa by:

- Expanding the extent and diversity of saltmarsh communities and the coastal broadleaf forest
- Providing clearly demarcated boundaries and signage to ecologically sensitive areas
- Developing strategies for planting and establishing vegetation cover that does not compromise the integrity of the landfill cap
- Trialling different restoration strategies.

Resilience and adaptation

Ensure that Meola Reef Reserve Te Tokaroa is prepared for changes in climate and sea level rise by designing strategies that allow for the ongoing adaptation of the site ecology and the use of the reserve.

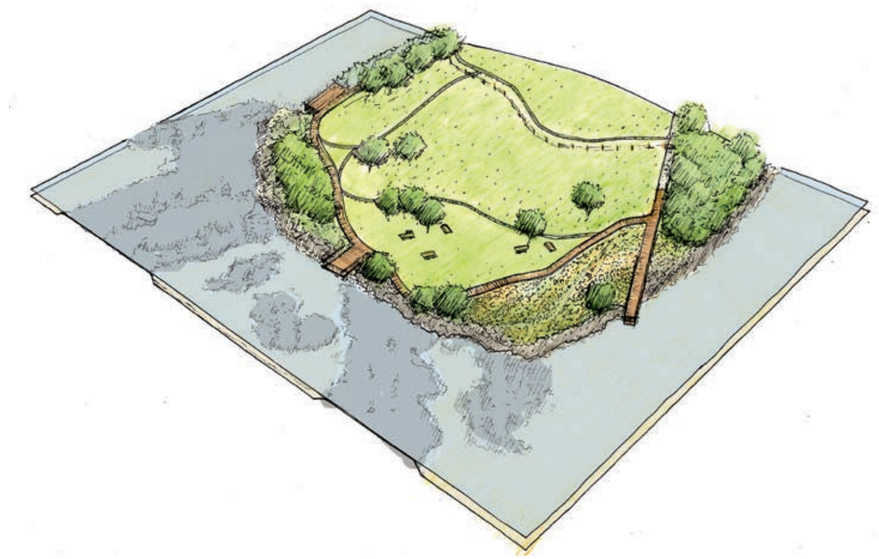
Maintenance and monitoring

Continue ongoing maintenance and monitoring at Meola Reef Reserve Te Tokaroa by:

- Creating a detailed management plan and monitoring programme
- Encouraging local residents and community groups to continue surveying the site using platforms such as New Zealand eBird.

Engagement and stewardship

Foster community interest in the ongoing enhancement of the biodiversity at Meola Reef Reserve Te Tokaroa by encouraging local residents and community groups to lead ecological restoration initiatives and ongoing monitoring and maintenance.



Diagrams demonstrating how the northern end of Meola Reef Reserve Te Tokaroa can adapt to changes in sea level through managed retreat and establishment of salt marsh communities.

3.5 Designing for people

Connectivity and accessibility

Develop a well connected, accessible path network with:

- Access to the full range of views and landscapes that the site has to offer
- A clear hierarchy, with a primary path that provides access to key site features without needing to go through the off-leash dog area
- A high quality path network that provides access to as wide a user group as possible, including children and people with disabilities, noting that the ongoing settlement of the underlying landfill means that this may not always be achievable
- Improved entrances and connections to new footpath and cycleway as well as connections with wider transport and open space network.

Amenity and comfort

Provide high quality, comfortable and durable amenities for people using the park through a range of spaces and furniture for sitting, picnicking, gathering etc. that offer the positive aspects of the climate, whatever that might be at the time - sun/shade, warmth/coolness, and shelter from the wind in a variety of locations around the site.

Crime Prevention Through Environmental Design

Develop a safe, connected, accessible reserve with:

- Wide and unimpeded primary path network to allow for easy walking and to maintain clear sight lines around corners and over the crests of hills, through fencing and gates
- Lighting and surveillance at main entry and carpark.

Communication

Reduce confusion and the potential for conflict between different uses with:

- Clear demarcation between different areas of the reserve
- Clear signage communicating desired outcome and appropriate use of the different areas of the reserve with visual cues such as gates and concise, clear and consistent signage.

Carpark expansion options

There are two basic options for expanding the existing carpark facilities.

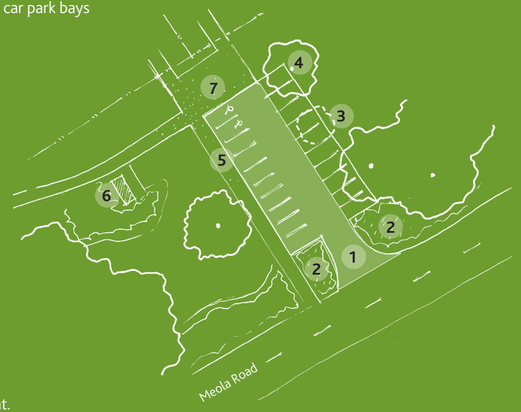
Option one – 20 car parks (in total)

Maintain existing access and circulation and create a new line of car park bays opposite the existing car park bays.

Existing car park

1. Meola Road access
2. Rain garden / Bioretention planting
3. Tree to be removed
4. Tree to be bridged or removed
5. Indicative new entry path
6. Existing public toilet
7. Indicative new entry space with bike facilities

Note Design is indicative only and will require further refinement.



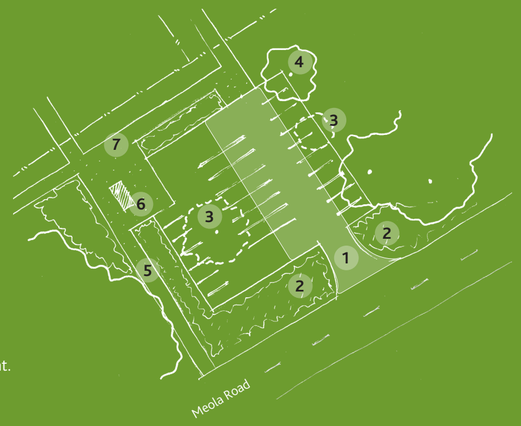
Option two – 29 car parks (in total)

Maintain existing access from Meola Road and expand car park to the west and east.

Existing car park

1. Meola Road access
2. Rain garden / Bioretention planting
3. Tree to be removed
4. Tree to be bridged or removed
5. Indicative new entry path
6. Existing public toilet
7. Indicative new entry space with bike facilities

Note Design is indicative only and will require further refinement.



NOT TO SCALE

0 5 10 20M

3.6 Designing for dogs and their owners

Design and amenities

Support the needs of dogs and their owners with:

- Amenities such as waste bins, dog waste bag dispensers and shade
- Location and entry / exit points to the off-leash dog area are close to entrance of the reserve
- Separated, off-leash area for small dogs.

Boundaries

Reduce the potential for conflict between off-leash dogs and other park users by providing clear and effective boundaries by:

- Clearly marking boundaries using a combination of fencing, signage and vegetation
- Ensuring that off-leash area signage is concise, clear and consistent.

Engagement and stewardship

Facilitate shared stewardship through:

- Direct engagement with dog owners and community groups, such as the Dog Owners Group - DOG, to establish formal partnerships with the Auckland Council Parks Services team
- Development of off-leash area code of conduct
- Opportunities to engage volunteers in education, monitoring, reporting, fundraising, and light maintenance of off-leash areas
- Explore opportunities for ecologically sensitive strategies to manage dog waste.

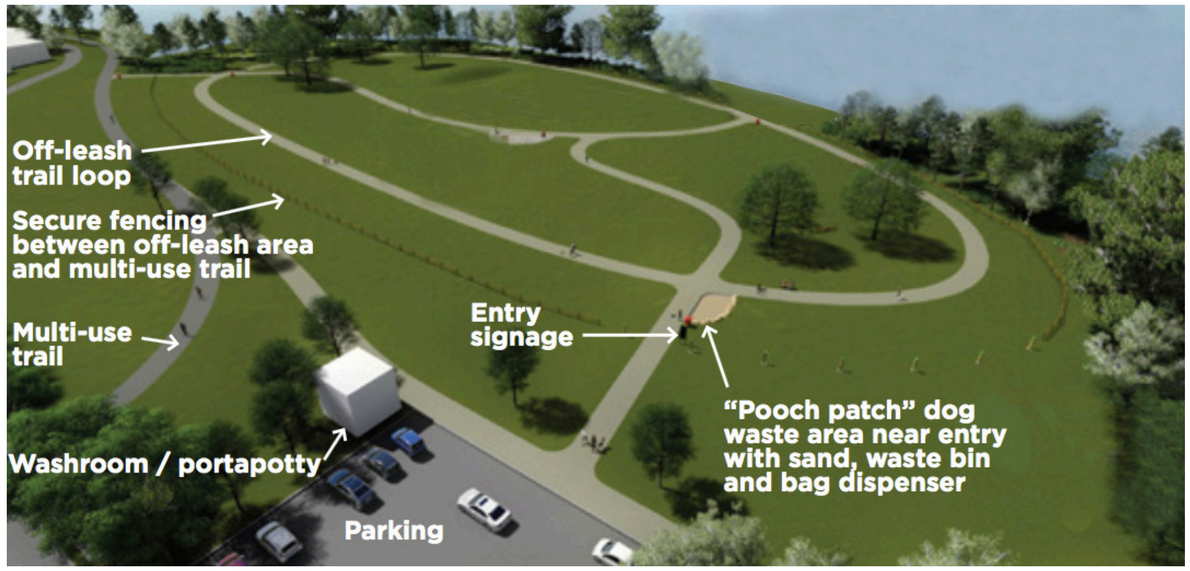


Diagram demonstrating key features and layout of off-leash dog park. Adapted from 'People, Parks and Dogs - Vancouver Board of Parks.and Recreation, 2017' 27

3.7 Vegetation strategy

The vegetation strategy is organised into six sections. The first section outlines planting strategies for the reserve to address the constraints and challenges associated with the landfill, cap and cover. The following six sections provide a general overview of the different plant communities for Meola Reef, which are based on a combination of their ecological niche and desired amenity and functions. All of the proposed vegetation is intended to maintain and enhance the existing biodiversity of the site and to create habitat for native wildlife (insects, reptiles and birds). The five plant communities are saltmarsh, coastal broadleaf forest, bioretention, rank grass and parkland trees.

It is anticipated that planting will be delivered through various means, including but not limited to, local board investment, local improvement projects, and community / volunteer groups etc.

Planting strategies

All planting undertaken at Meola Reef needs to carefully consider the constraints associated with the landfill, cover and cap. There are two broad strategies proposed to achieve this that can be applied individually or in combination on a case by case basis:

- Plant species with shallow root systems
- Build up the thickness of the landfill cover by adding and/or combining material such as topsoil and/or rock armament to the existing cover.

Herbaceous and shrubby plants associated with salt marshes and bioretention typically have shallower root systems than trees and should only require limited additional cover material. Where larger tree species are desired, it is highly recommended that the landfill cover is built up to allow for deeper rooting plants. In some cases, it may be appropriate and desirable to line the ground with a geotextile or root barrier and mound soil to prepare the ground.

Monitoring of all planting should be maintained to ensure that any problems regarding the health of the plantings is identified and remedied as early as possible.

Saltmarsh

Enrich and extend existing salt marsh vegetation on basaltic lava field and extend habitat along coastal edge and into low-lying areas of the reserve as sea levels rise and new ecological niches emerge. Rock armament and topsoil should be added and combined with the existing surface to create appropriate habitat for plants as required. Some species such as glasswort (Sarcocornaria quinqueflora) and remuremu (Selliera radicans) will establish naturally and do not need to be planted while other species may be suitable for restoration but will likely need to be planted. These include but are not limited to oioi (Apodasmia similis), sea rush (Juncus krausii var. australiensis), needle grass (Austrostipa stipoides), saltmarsh ribbonwood (Plagianthius divaricatus), and pohuehue (Muehlenbeckia complexa). Planting of threatened coastal species such as Mimulus repens (naturally uncommon) could also be undertaken in consultation with Auckland Council's Biodiversity team.

Management of these restoration sites should avoid facilitating the establishment of exotic salt-tolerant grasses or mangroves, which may displace saltmarsh communities.

Bioretention

Low lying areas prone to ponding and overland flow paths are planted with a mix of water tolerant plants. While there is not necessarily a need to build up the thickness of the landfill cover to prevent roots penetrating the landfill, it may be desirable to line the surface with a low permeability material such as clay to reduce the amount of water infiltrating into the landfill. Typical planting species should include spreading swamp sedge (Carex lessoniana), oioi (Apodasmia similis) hebe (Hebe speciosa), wiwi (Ficinia nodosa), and harakeke (Phormium tenax).

Coastal broadleaf forest

Enrich and extend existing coastal broadleaf forest and coastal scrub along the eastern and western edges of the park to create habitat for a wide range of birds, insects and reptiles. In general, most indigenous species are considered to be relatively shallow rooting, rarely exceeding a depth of two meters, although this is dependent on soil type, slope, and other physical variables.[32] As such, it is anticipated that the existing landfill cover will need to be increased through the addition of material such as topsoil and/or rock armament.

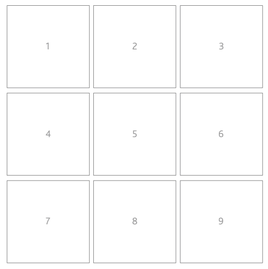
Typical species in the first generation of planting include but are not limited to large fruit karamu* (Coprosma macrocarpa subsp. minor), taupata (Coprosma repens), kanuka (Kunzea robusta), manuka* (Leptospermum scoparium var. scoparium), wharangi (Melicope ternata), mahoe (Melicytus ramiflorus), ngaio (Myoporum laetum), mapou* (Myrsine australis), kawakawa (Piper excelsum subsp. excelsum), and houpara* (Pseudopanax lessonii). The second generation of enrichment planting could include pohutukawa (Metrosideros excelsa), tanekaha (Phyllocladus trichomanoides), pukanui (Meryta sinclairii), tawapou (Planchonella costata), and kowhai (Sophora chathamica).

Parkland trees

Large specimen trees could be desirable in select locations to contribute to the overall amenity and character of the reserve, to frame views, to provide shade and/or create outdoor spaces. Parkland trees can be planted as single specimen trees or in clusters, either with grass understory or in combination with low lying amenity planting. It is anticipated that the existing landfill cover will need to be increased through the addition of material such as topsoil and/or rock armament for all parkland trees. Typical species include pohutukawa (Metrosideros excelsa), tanekaha (Phyllocladus trichomanoides), tawapou (Planchonella costata), and kowhai (Sophora chathamica).

Rank grass

Rank grass is maintained on the northern slope of the reserve, in small pockets and along primary paths to maintain sight lines and for skink habitat.



Key

1. Saltmarsh vegetation
2. Ureure / glasswort (Sarcocornaria quinqueflora)
3. Bioretention vegetation
4. Oioi (Apodasmia similis)
5. Coastal broadleaf forest vegetation
6. Mahoe (Melicytus ramiflorus)
7. Houpara* (Pseudopanax lessonii)
8. Parkland trees - pohutukawa (Metrosideros excelsa)
9. Rank grass

* Species known to have relatively shallow root systems, reaching mean root depths of <0.5m at five years.[33]

Notes

- Species recommendations within this document does not guarantee performance of the particular plant.
- Designers should undertake their own specific appraisal of the recommended species in relation to their specific design and detailed knowledge of the site.
- All planting and management of plants should be implemented using best practice techniques and procedures.
- All trees and plants should be sourced from the Tāmaki Ecological District.

3.8 Surface strategy

The surface treatment of paths and other features such as decking and dog park facilities will help to determine the accessibility, safety, comfort and experience of Meola Reef Reserve Te Tokaroa. The continued settling of the land means that any surfaces will need to be flexible enough to conform with the underlying surface, maintenance requirements, and whole of life costs of the path. The surface strategy for Meola Reef Reserve Te Tokaroa includes three different materials of varying widths.

Bound gravel 3m | 1.5m

Compacted gravel path utilising regionally sourced aggregates. Surface to be self binding rolled or compacted. Final aggregate to be to a compacted quarry dust grade finish. Quarry dust aggregate selection to be placed over a compacted base and subbase to engineering specifications. Bound gravel paths traversing areas with poor drainage should be built up to sufficient levels to reduce the likelihood of paths becoming flooded. Where paths will cause areas of land to "pond", drainage is recommended to allow water to flow beneath the path and toward bioretention plantings.

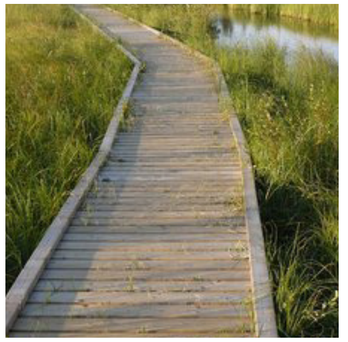
Timber boardwalk and decking 3m | 1.5m

FSC certified hardwood decking boards and/or H6 treated pine piles. Planks to be run perpendicular to the line of travel and gaps between boards are to be 6mm. Tamper proof screw fastenings to be countersunk and sized to suit timber dimensions and loadings. Large countersunk fixings (e.g. large screws and bolts) to be filled with a black flexible sealant finished flush with the timber surface. A 75mm high x 100mm wide timber kick rail to be included along edge of all boardwalks presenting a fall height less than 500mm high. Tamper proof screw or bolt fastenings to be countersunk and sized to suit timber dimensions and loadings. Large fixing holes to be filled with black flexible sealant.

Mown path 1.2m

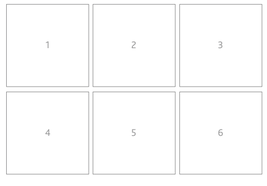
Select routes are maintained as mown paths for dry weather access. Regular mowing is recommended to increase the density of grass, improving strength and durability. Where possible, mown paths located in areas with poor drainage should be built up to allow water to flow beneath the path and toward bioretention plantings.






Key

1. Bound gravel path
2. Bound gravel surface
3. Timber boardwalk
4. Timber boardwalk and kick rail
5. Mown path
6. Mown path surface



3.9 Kit of parts

The 'kit of parts' includes all the furnishings and fixtures recommended for Meola Reef Reserve Te Tokaroa. They include fencing and gates, rock abatements, seating, signage and path markings, bike racks, drinking fountains, and other dog park facilities. The kit of parts for Meola Reef Reserve Te Tokaroa is understated and durable to fit with the character and environmental challenges of the 'wild' coastal landscape.

Fencing and gates

Fencing and gates will be used to manage access between different zones of the reserve. Fencing will be needed to manage the movement of dogs in particular and should be visually recessive and inconspicuous.

Recommended fencing is a standard driven post and wire mesh farm fence. Mesh to be hot dip galvanised 2.5mm wire mesh in a 100 x 100mm grid arrangement. All gates are to be spring-hinged or otherwise self-shutting and are proposed to be constructed in macrocarpa timber in a similar style to a typical farm gate. All fixings, fastenings and hinges to be 316 stainless steel.

Rock abatements

Regrade bank and where required, line with rock to stabilise bank and facilitate the establishment of saltmarsh vegetation.

Signage - Wayfinding

Wayfinding signs provide users with direction and distances to key destinations and are placed at entry and exit points and at intersections and key "decision points" throughout the reserve.

Signage - Code of conduct and safety

Code of compliance and safety signage communicating desired outcome and appropriate use of the different areas of the reserve.

Signage - Interpretive

Interpretation signage to reveal, explain and where appropriate, celebrate the intrinsic value of the diverse geological, Māori and colonial history of the site as well as the use as a landfill. In its most basic manifestation, this could be achieved through interpretation signage. However this brief could be expanded to include interactive / spatial signage and/or place based interpretive artworks.

Bench seats

Bench seats to be constructed using matching timber species and profile to that used to form the base of the picnic tables. Seats should include back and arm rests.

Picnic tables

Proprietary macrocarpa picnic tables to match those existing on site. Eight seater picnic table or similar.

Bike racks

Bike racks located at Meola Road entrance in coordination with proposed bike path to encourage cyclists to dismount and walk the reserve.

Drinking fountains

Drinking fountains will be located at the primary entrance in close proximity to the existing public toilet and at key locations through the off-leash dog area.

Dog park facilities

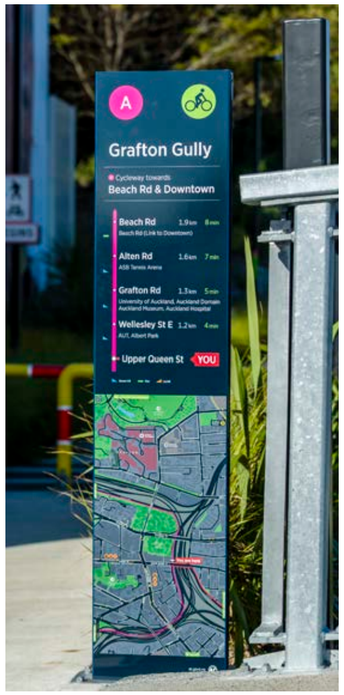
Larger areas of bound gravel positioned at primary entrances form focal areas for dog park facilities including compostible dog waste bag dispensers and/or shared community bag baskets and waste receptacles. Composting units and associated management should be explored as part of the ongoing use of the park for sustainable management of dog wastes.

Rubbish bins

Research suggests that an absence of rubbish bins in natural and remote places encourages people to take care of their own waste and take it with them when they leave the site. As such, the only bins that will be recommended for the reserve are those associated with the dog waste facilities in the on-leash dog area.

Key

1. Timber picnic table
2. Signage Wayfinding
3. Timber boardwalk and kick rail
4. Timber bench seat
5. Fence
6. Bike Rack
7. Drinking Fountain
8. Example of interactive spatial signage
9. Same as above
10. Same as above



4 Action plan

The Action Plan outlines the scope and cost of potential projects that collectively make up the Meola Reef Reserve Te Tokaroa development plan. The estimates are an indicative guide only and are subject to further scope refinement during the investigation and design phase. The estimates have been prepared for Auckland Council for budget setting and prioritisation considerations only.

The estimates have been prepared by utilising recent tendered amounts for similar type work within the Auckland region.

A contingency of 30 per cent has been added to allow for relatively low level of scope certainty and project risks for budgeting purposes.

Meola Reef - action plan

4.1 Relocation and improvement to dog park

Key

- Protected ecology
- People + ecology (no dogs)
- Mixed recreation (dogs on-leash)
- Dogs off-leash
- 1m bound gravel
- Chain link fence
- Gate
- Access point with wayfinding signage
- Drinking fountain
- Dog facilities
- Fenced off-leash small dog area

Outcome

Relocate off-leash dog area to:

- Improve amenity for users including views of Waitematā Harbour, ground conditions and access from car park and reserve entries
- Provide an ecological buffer
- Reduce conflict between the different users of the park - dogs, passive recreation and bird habitat.

Dependencies

- Archaeological assessment must be undertaken before any large scale capital works begin
- Landfill management works to improve cap need to be completed in conjunction with the dog park relocation and improvement.

Cost estimates

Cost indication for relocation and improvement to dog park
$970,000.00

Budget sources

- **Renewals**
  Renewals include Dog off-leash perimeter fencing; Gravel paths; Dog drinking water supply; Dog waste bin and bag dispenser; Signage
- **New assets**
  New assets include Reserve boundary fence to create decision points; Small dog zone perimeter fence; Ecology boundary fence; Dog washing facilities; Dog exercise facilities (optional); Seats.

4.2 Improve access - primary path network

Key

- Protected ecology
- People + ecology (no dogs)
- Mixed recreation (dogs on-leash)
- Dogs off-leash
- 2-3m bound gravel

Outcome

Renew existing primary path network to create a 'loop track' around the relocated off-leash dog area.

Dependencies

- Archaeological assessment must be undertaken before any large scale capital works begin.
- The off-leash dog area needs to be relocated in order to create the primary loop track.
- Landfill management works to improve cap and coastal edge improvement works need to be completed in conjunction with the primary loop track relocation.

Cost estimates

Cost indication for renewal of primary path network
$1,000,000.00

The renewal of the primary path network could be funded through capital renewal budgets.

4.3 Improve access and amenity – Secondary path network and furnishings

Outcome

Improve access and amenity for park users through the upgrade of the secondary path network and existing furnishings.

Dependencies

- Archaeological assessment must be undertaken before any large scale capital works begin
- The primary path network needs to be completed before the secondary path network is improved
- Landfill management works to improve cap and coastal edge improvements works need to be completed before the secondary path network is improved.

Cost estimates

Cost indication for improved access and amenity $700,000.00

Budget sources

- **Renewals**
  Renewals include secondary path network including gravel and mown path, picnic tables, bench seats, drinking fountain and signage
- **New Assets**
  New assets include interpretation signage and new facilities for bikes.

4.4 Improve ecological and coastal edge

Outcome

Improve the ecological outcomes of the reserve through:

- Enrichment of existing coastal forest
- Coastal edge protection and establishment of new salt marsh habitat
- New boardwalk to provide access and to help buffer new salt-marsh habitat.

Dependencies

- Archaeological assessment must be undertaken before any large scale capital works begin
- The off-leash dog area and associated fencing needs to be implemented before efforts are made to create new and improved habitat for birds
- Landfill management works to improve cap, coastal edge and rock armouring need to be completed before salt marsh and coastal forest planting can occur.

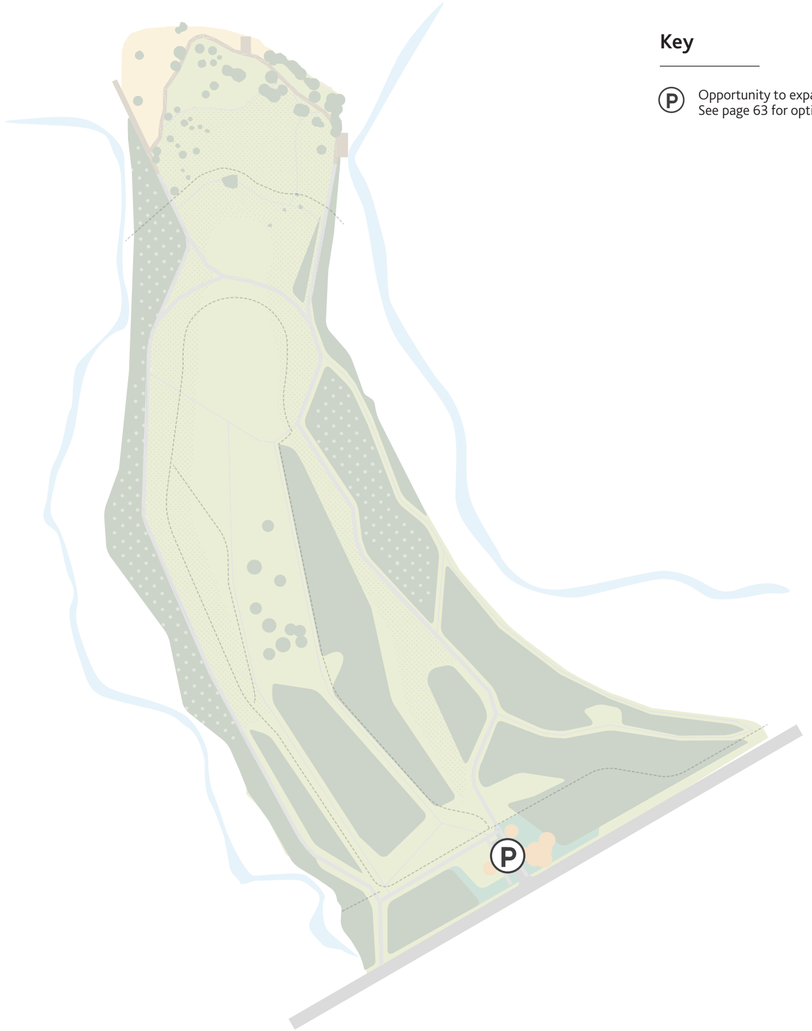
Cost estimates

Cost indication for improved ecological and coastal edge $12,560,000.00

Budget Sources

- **Renewals**
  Renewals include earthworks and drainage improvements for new planting, rock armouring of coastal edge and preparation of ground for new salt marsh habitat
- **New assets**
  New assets include supply of plants for coastal forest ecology and salt marsh habitat to a landscape garden standard and timber boardwalk and platforms
- **Volunteers**
  Some of the planting and maintenance of plants as they establish could be undertaken by volunteers.

4.5 Carpark extension options



Key

Opportunity to expand car park
See page 63 for options

Outcome

Increase the capcity of existing carpark and improve water quality of stormwater runoff.

Dependencies

- The Auckland Council closed landfill management team and Auckland Transport need to be consulted for any redesign of the existing carpark
- Archaeological assessment must be undertaken before any large scale capital works begin.

Cost estimates

Option One – 20 Car Parks Total $355,000.00

Option Two – 29 Car Parks Total $515,000.00

The extension of the existing carpark will be funded through capital and renewal budgets.

5 Footnotes

1. International Association for Public Participation (IAP2) Spectrum of Participation - http://c.ymcdn.com/sites/www.iap2.org/resource/resmgr/foundations_course/IAP2_P2_Spectrum_FINAL.pdf
2. Auckland Design Manaual - http://www.aucklanddesignmanual.co.nz/design-thinking/maori-design/te_aranga_principles
3. Ibid
4. History sourced from:
   - 'City Design' (2002). Meola Reef and Associated Reserves Management Plan (Final), Auckland City Council; and
   - Hayward, B.W. et al. (2011) Volcanes of Auckland. Auckland University Press, Auckland.
5. Walker, A H. Rangi·Mata·Rau, Pt Chevalier Centennial 1861-1961.
6. Wikipedia - https://en.wikipedia.org/wiki/Point_Chevalier
7. Walker, A H. Rangi·Mata·Rau, Pt Chevalier Centennial 1861-1961.
8. Ibid.
9. AECOM New Zealand Limited (2017). Motions/Meola Landfill Investigation Report.
10. 'City Design' (2000). Meola Reef and Associated Reserves Management Plan (Draft), Auckland City Council;
11. The sculpture is by Tim Codyre, carved from macrocarpa wood originally from trees which grow on Coyle Park, at the tip of the Pt Chevalier peninsula.
12. The entire Meola Reef Reserve is a designated a terrestrial significant ecological area (SEA_T_6119) with a narrow band on the northern edge of the reserve at the transition to the intertidal reef also designated as an SEA (SEA_T_6243). Terrestrial Significant Ecological Areas (SEA's) are identified based on their values for representativeness, threat status and rarity, diversity, stepping stones, and overall uniqueness in accordance with Schedule 3 of the Unitary Plan.
13. AECOM New Zealand Limited (2017). Motions/Meola Landfill Investigation Report.
14. Ibid.
15. Ibid.
16. Ibid.
17. Ibid.
18. Ibid.
19. Ibid.
20. For more infomration on Water Sensitive Urban Design see Auckland Design Manual - http://www.aucklanddesignmanual.co.nz/project-type/infrastructure/technical-guidance/wsd
21. See State of the Auckland Report - http://stateofauckland.aucklandcouncil.govt.nz/freshwater-report-card/albert-eden-roskill-reporting-area-2/
22. AECOM New Zealand Limited (2017). Motions/Meola Landfill Investigation Report.
23. See State of the Auckland Report - http://stateofauckland.aucklandcouncil.govt.nz/freshwater-report-card/waitemata-reporting-area-2/
24. AECOM New Zealand Limited (2017). Motions/Meola Landfill Investigation Report.
25. See State of the Auckland Report - https://www.watercare.co.nz/SiteCollectionDocuments/AllPDFs/CentralInterceptorFactsheet.pdf
26. Parkyn et al. 2000
27. For more information see - http://vancouver.ca/parks-recreation-culture/people-parks-dogs-strategy.aspx

6 Appendices

Appendix A – Observations recorded in New Zealand eBird from 2009-2017 (ebird.org accessed 30/03/2017)

Common Name	Species	New Zealand status	Conservation status
Black-billed Gull	Chroicocephalus bulleri	Endemic	Nationally Critical
Reef heron	Egretta sacra	Native	Nationally Endangered
New Zealand Dotterel	Charadrius obscurus	Endemic	Nationally Vulnerable
Red-billed Gull	Chroicocephalus scopulinus	Native	Nationally Vulnerable
Caspian Tern	Hydroprogne caspia	Native	Nationally Vulnerable
Pied Shag	Phalacrocorax varius	Native	Nationally Vulnerable
Buff-banded Rail	Gallirallus philippensis	Native	Declining
South Island Pied Oystercatcher	Haematopus finschi	Endemic	Declining
Pied Stilt	Himantopus leucocephalus	Native	Declining
Bar-tailed Godwit	Limosa lapponica	Native	Declining
Variable Oystercatcher	Haematopus unicolor	Endemic	Recovering
Black Shag	Phalacrocorax carbo	Native	Naturally Uncommon
Little black shag	Phalacrocorax sulcirostris	Native	Naturally Uncommon
Australasian Harrier	Circus approximans	Native	Not Threatened
Black Swan	Cygnus atratus	Native	Not Threatened
Shining Cuckoo	Chrysococcyx lucidus	Native	Not Threatened
White-faced Heron	Egretta novaehollandiae	Native	Not Threatened
Grey Warbler	Gerygone igata	Endemic	Not Threatened
Kereru	Hemiphaga novaeseelandiae	Endemic	Not Threatened
Welcome Swallow	Hirundo neoxena	Native	Not Threatened
South Black Backed Gull	Larus dominicanus	Native	Not Threatened
Little Pied Shag	Microcarbo melanoleucos	Native	Not Threatened
Australasian Gannet	Morus serrator	Native	Not Threatened
Pukeko	Porphyrio melanotus	Native	Not Threatened
Tui	Prosthemadera novaeseelandiae	Endemic	Not Threatened
New Zealand Fantail	Rhipidura fuliginosa	Endemic	Not Threatened
Sacred Kingfisher	Todiramphus sanctus	Native	Not Threatened
Spur-winged Plover	Vanellus miles	Native	Not Threatened
Silver-eye	Zosterops lateralis	Native	Not Threatened
Royal Spoonbill	Platalea regia	Native	Vagrant
Common Myna	Acridotheres tristis	Introduced and Naturalised	
Skylark	Alauda arvensis	Introduced and Naturalised	
Mallard	Anas platyrhynchos	Introduced and Naturalised	
California Quail	Callipepla californica	Introduced and Naturalised	
European Goldfinch	Carduelis carduelis	Introduced and Naturalised	
European Greenfinch	Chloris chloris	Introduced and Naturalised	
Rock Pigeon	Columba livia	Introduced and Naturalised	
Yellowhammer	Emberiza citrinella	Introduced and Naturalised	
Chaffinch	Fringilla coelebs	Introduced and Naturalised	
Australian Magpie	Gymnorhina tibicen	Introduced and Naturalised	
House Sparrow	Passer domesticus	Introduced and Naturalised	
Ring-necked Pheasant	Phasianus colchicus	Introduced and Naturalised	
Eastern Rosella	Platycercus eximius	Introduced and Naturalised	
Dunnock	Prunella modularis	Introduced and Naturalised	

Appendix B – Native lizard observations within the Tāmaki Ecological District likely to be present on site (EcoGecko, 2017; Hitchmough, 2012)

Species	Common name	Threat status
Oligosoma aeneum	Copper skink	Not Threatened
Oligosoma ornatum	Ornate skink	At Risk - Declining
Oligosoma moco	Moko skink	At Risk - Relict
Oligosoma ornatym	Shore skink	Not Threatened
Mokopirirakau granulatus	Forest gecko	At Risk - Declining
Naultinus elegans	Elegant gecko	At Risk - Declining

Appendix C – Recommended Plant List for Saltmarsh Planting*

Species	Common name
Sedges/rushes	
Apodasmia similis	oioi
Austrostipa stipoides	needle grass
Carex secta	purei
Cyperus ustulatus	giant umbrella sedge
Ficinia nodosa	wiwi / knobby clubrush
Juncus krausii var. australiensis	sea rush
Machaerina juncea	tussock swamp / twig rush
Mimulus repens (threatened species - could be planted in consultation with Auckland Council's Biodiversity team)	monkey flower / native musk
Muehlenbeckia complexa	pohuehue
Plagianthius divaricatus	saltmarsh ribbonwood
Sarcocornaria quinqueflora	ureure / glasswort
Selliera radicans	remuremu

Appendix D – Recommended Plant List for Coastal Broadleaf Forest Planting*

Species	Common name
Sedges/rushes	
Carex banksiana	
Carex lambertiana	forest sedge / bush sedge
Carex uncinata	hook grass / hook sedge
Dianella nigra	turutu
Shrubs	
Arthropodium cirratum	rengarenga
Astelia banksii	kowharawhara
Austroderia fulvida	toetoe
Muehlenbeckia complexa	pohuehue
Olearia solandri	coastal tree daisy
Plagianthus divaricatus	makaka / saltmarsh ribbonwood
Phormium tenax	harakeke / flax
Veronica stricta	koromiko / hebe
Trees	
Beilschmiedia tarairi	taraire
Coprosma macrocarpa subsp. minor	coastal karamu
Coprosma repens	taupata
Coprosma robusta	karamu
Cordyline australis	tī kōuka / cabbage tree
Corynocarpus laevigatus	karaka
Dysoxylum spectabile	kohekohe
Geniostoma ligustrifolium	hangehange
Knightia excelsa	rewarewa
Kunzea robusta	kanuka
Leptospermum scoparium var. scoparium	manuka
Leucopogon fasciculatus	mingimingi
Melicope ternata	wharangi
Melicytus ramiflorus	mahoe
Meryta sinclairii	pukanui
Metrosideros excelsa	pohutukawa
Myoporum laetum	ngaio
Myrsine australis	mapou
Phyllocladus trichomanoides	tanekaha
Piper excelsum subsp. excelsum	kawakawa
Planchonella costata	tawapou
Podocarpus totara	totara
Pseudopanax lessonii	houpara
Sophora chathamica	kowhai
Vitex lucens	puriri

* Please note - these lists are not exhaustive. See 3.7 Vegetation Strategy on pages 66-67 for information on planting typologies.

Appendix E – Mana Whenua Site Walkover Notes

Attendee	Iwi / Organisation
Mike Baker	Ngaati Whanaunga
Zaelene Maxwell-Butler	Ngāi Tai Ki Tāmaki
Adrian Pettit	Te Ākitai Waiohua
Josy Peita	Ngāti Te Ata Waiohua
Tame Terangi	Te Rūnanga o Ngāti Whātua
Richard Northey	Waitematā Local Board - Auckland Council
Pippa Coom	Waitematā Local Board - Auckland Council
Joby Barham	Community Parks & Places - Auckland Council
Gary Marshall	Resilio Studio
Jack Haldane-Willis	Resilio Studio
Fiona Ting	Resilio Studio

Notes
Signage, wayfinding & entrance
• The park is not welcoming • Wayfinding is missing - provide information on where the paths lead, how long will it take to get to the northern end etc • Signage communicating unsafe water quality and risk to dogs
Access & circulation
• Provide a loop track and coastal access
Dogs & dog walkers
• Provide appropriately for dog walkers • Provide a higher level of amenity for dog walkers, and minimise the impact of dogs on other uses and ecological values • Provide for appropriate areas for off-leash dogs, on-leash dogs, and areas where dogs are not allowed • Within the off-leash area for dogs, provide an area for small dogs, separate to the area for big dogs • Work with experts on dog management (e.g. seek advice from the Police) and look at case studies (e.g. Miranda) • Provide appropriate height of dog fence • Unsure about mixing zzs and dogs
Linked up / Connected thinking
• Work with Closed Landfills team and Healthy Waters team on addressing the ecological and safety issues with the site • Include the Closed Landfills team in the draft plan presentation
Tohu - The wider cultural landscape
• Provide for and enhance views of maunga • Profile, communicate and educate on the importance of the Te Tokaroa / Meola Reef geological lava flow to enable the geological, natural and mana whenua history to become the starting point for engaging with the site • Acknowledge the landfill and provide opportunity to mourn over the history of the treatment of the site • Remediate and curb further degradation of the site
Taiao - The natural environment
• Extend and enhance salt marsh habitat e.g. ureure / glasswort • Extend and enhance coastal forest ecology • Provide for indigenous grasses and sedges • Protect ecology – birds and dogs don't mix
Whakapapa - Names & naming
• Recognise and celebrate the significance of Te Tokaroa as a traditional place name

Appendix F – Phase One Consultation

Please contact Waitematā Local Board for record of pre-consultation feedback and responses.

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