

Agenda/Panui

Ngā Poutiriao o Mauao **Mauao Joint Administration Board**

Venue: Whareroa Marae
Te Awa o Tukorako Lane,
Mt Maunganui

Date: Tuesday, 6 October 2015

Time: 9.30 am

Agenda/Panui

Ngā Poutiriao o Mauao (Mauao Joint Administration Board)

Meeting No. 10

Tuesday, 6 October 2015

9.30 am

**Whareroa Marae, Te Awa o Tukorako Lane
Mt Maunganui**

OPEN SECTION

Karakia

Apologies

Acceptance of Late Items

Confirmation of Minutes / Matters Arising

- (i) Previous Minutes for Confirmation dated 4 August 2015 (attached) (Pgs.1-3)**
- (ii) Matters Arising**

Declarations of Conflicts of Interest

Business

- 1. Mauao Operational Report September 2015 (Pgs.4-11)**

To inform Nga Poutiriao o Mauao (Mauao Joint Administration Board) of operation matters from August 2015 to end of September 2015.

- *Appendix 1 New Rules for Drones and the Implication for Mauao – Pgs.9-10*
-

- *Appendix 2 Tikanga and Marine Mammal Management – Pg.11*

2. Review of the Mauao Historic Reserve Management Plan (Pgs.12-139)

To present the updated Conservation Plan undertaken as part of the review.

To seek agreement to Council publicly notifying the intention to review the Mauao Historic Reserve Management Plan.

- *Attachment A Conservation Plan Volume 1 and Volume 2 – Pg.16-139*

3. Presentation – Mauao Trust Strategic Plan Review

4. Next Meeting

The next meeting of Ngā Poutiriao o Mauao has been scheduled for 1 December 2015 – 9.30 am.

Karakia



MINUTES

Ngā Poutiriao o Mauao

Mauao Joint Administration Board

Meeting No. 9

Tuesday, 4 August 2015
9.30 am

Tauranga City Council Te Awanui Harbour Room

OPEN SECTION

Members Present:

s 7(2)(a) - Privacy (Chairperson)

s 7(2)(f)(ii)

Cr Steve Morris

s 7(2)(f)(iii)

s 7(2)(a) - Privacy (Ngati Ranginui Iwi)

Also Present:

s 7(2)(a) - Privacy (NZ Historic Places Trust)

Apologies:

s 7(2)(a) - Privacy (Mauao Trust)

s 7(2)(a) - Privacy (Mauao Trustee)

Absent:

s 7(2)(a) - Privacy (Te Runanga o Ngai Te Rangi Iwi Trust)

s 7(2)(a) - Privacy (Waitaha a Hei)

In Attendance:

s 7(2)(f)(ii)

1. Karakia

s 7(2)(a) - Privacy opened the meeting with a Karakia.

2. **Apologies**

Moved: s 7(2)(f)(ii) Seconded: s 7(2)(f)(ii)

That it be Resolved

That the Ngā Poutiriao o Mauao – Joint Administration Board:

Receive apologies from s 7(2)(a) - Privacy (Ngā Poutiriao o Mauao Trustees).

CARRIED

3. **Confirmation of Minutes / Matters Arising**

Moved: s 7(2)(f)(ii) Seconded: s 7(2)(a) - Privacy

That it be Resolved

That the Ngā Poutiriao o Mauao – Joint Administration Board:

(a) Confirm the previous minutes dated 9 June 2015 – Meeting No.8 as a true and correct record.

CARRIED

BUSINESS

4. **Mauao Operational Report July 2015**

s 7(2)(f)(ii) t, introduced s 7(2)(f)(ii) who highlighted key aspects of the report and responded to questions.

Key Points

- Draft operational protocols were still a work in progress
- Would investigate options for renewal of visitor counters
- Acknowledged need to establish strong relationship with the Trust
- Discussed challenges associated with a predator fence.

Points Raised by Members

- Noted volunteer numbers had declined over time
- Concern around the watering of plants over the summer.

Moved: Cr Morris / Seconded: s 7(2)(f)(ii)

That it be Resolved

That the Ngā Poutiriao o Mauao – Joint Administration Board:

(a) Receive the Mauao Operational Report July 2015.

CARRIED

5. **Update on Review of the Mauao Historic Review Management Plan**

§ 7(2)(f)(ii)

highlighted key aspects of the report and responded to questions.

Key Points

- Noted that the timeframe for the Mauao Trust to review their strategic plan had been extended by an additional two months to May 2017
- Conservation plan would be presented at the October 2015 meeting of the Board.

In Response to Questions

- Strategic plan was a key piece of work to inform the management plan.

Moved: § 7(2)(a) - Privacy / **Seconded:** § 7(2)(f)(ii)

That it be Resolved

That Ngā Poutiriao o Mauao – Joint Administration Board:

- (a) ***Receive the Update on Review of the Mauao Historic Review Management Plan.***

CARRIED

CLOSED SECTION

6. **Confirmation of Minutes / Matters Arising**

Moved: Cr Morris / **Seconded:** § 7(2)(f)(ii)

That it be Resolved

That the Ngā Poutiriao o Mauao – Joint Administration Board:

- (a) ***Confirm the previous minutes dated 9 June 2015 – Meeting No.8 as a true and correct record.***

CARRIED

7. **Karakia Whakamutunga**

§ 7(2)(f)(ii)

closed the meeting with a Karakia.

The meeting closed at 10.11 a.m.

Mauao Operational Report September 2015

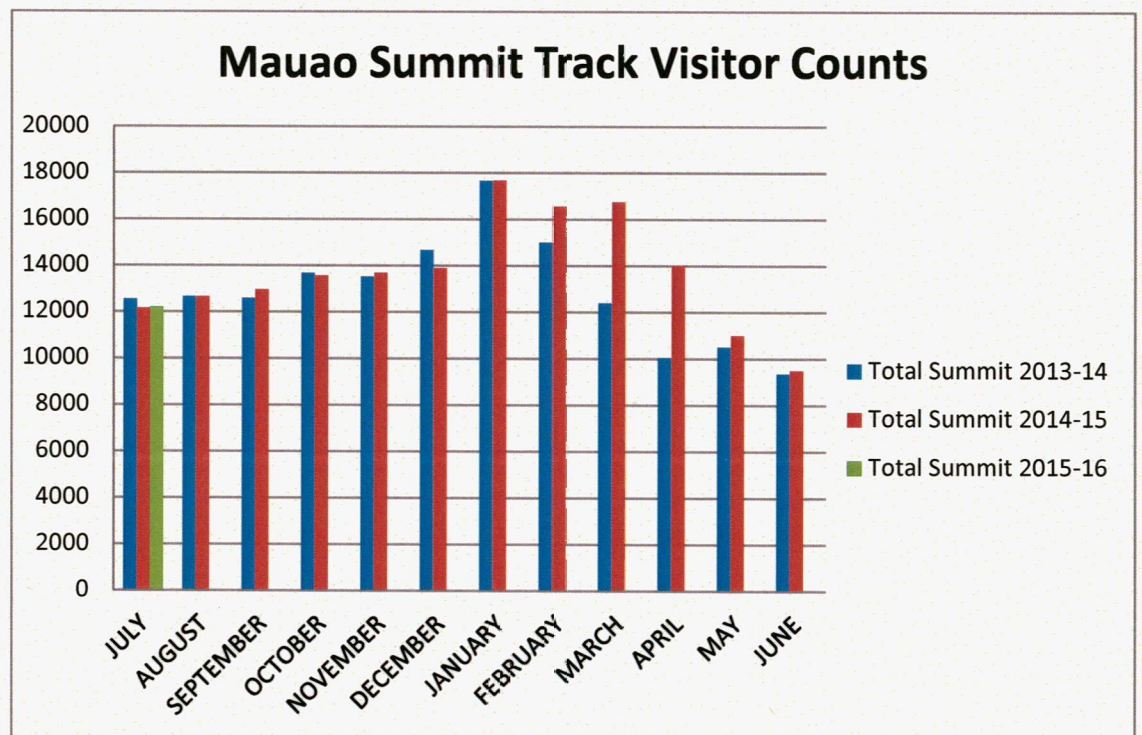
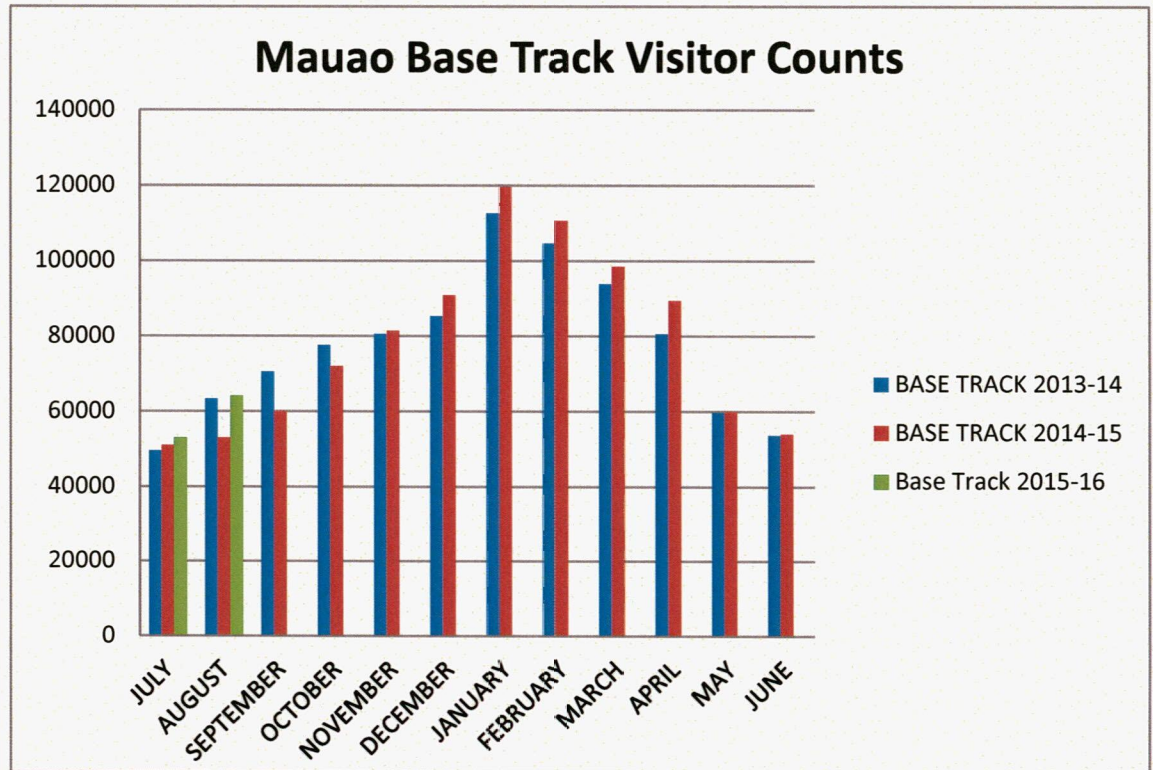
Purpose

1. To inform Nga Poutiriao o Mauao (Mauao Joint Administration Board) of operational matters from August 2015 to end of September 2015 and seek guidance from the Board.

Executive Summary

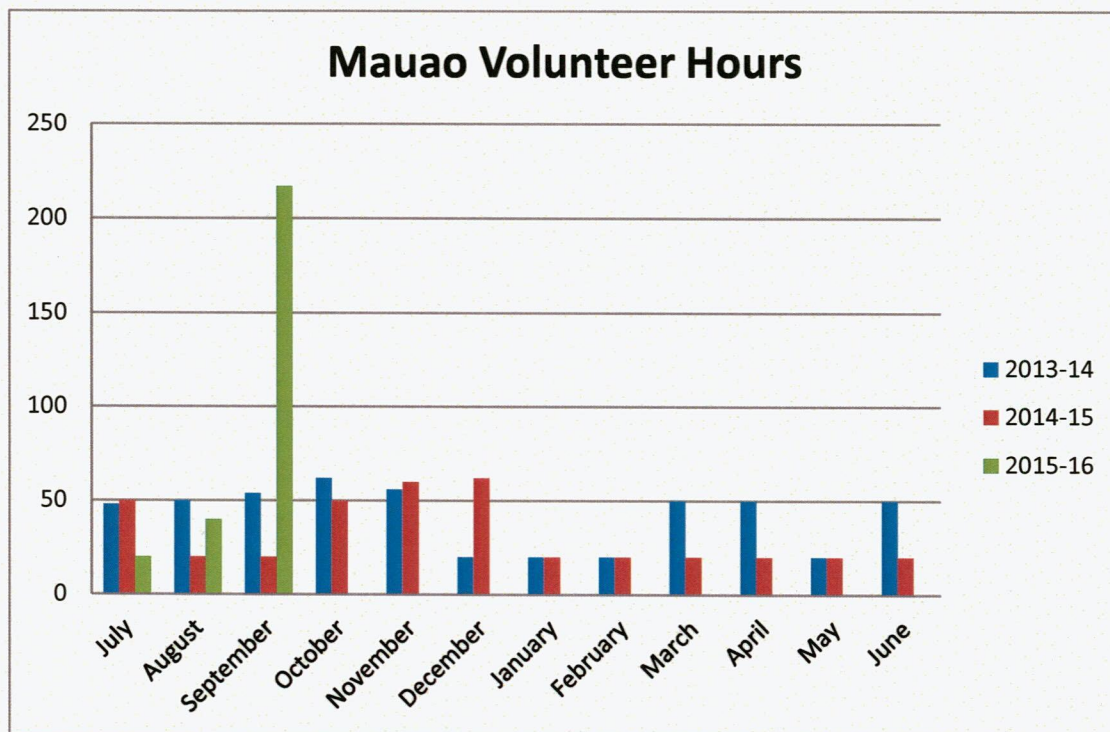
2. Request received for memorial table, seat or trees for [REDACTED] family. Refer to recommendation (b) and discussion item (9.) for details.
3. New rules for Drones have come into effect. Refer to recommendation (c) and discussion item (10.) for details.
4. Request received from the Department of Conservation for the potential development of seal/ marine mammal interpretation signage on the Mauao base track. Refer to recommendation (d) and discussion item (11.) for details.
5. Routine maintenance has been undertaken over this period including:
 - Plant and animal pest control
 - Four wheel drive track maintenance
 - Walkway maintenance
 - Sign and structure maintenance
6. Two new coastal warning signs have been produced and are ready to use, ensuring improved public safety in the management of large swell and storm surge events. The signs will be installed in a warning mode initially when hazardous conditions exist. If conditions worsen and track closure is required the signs will be adjusted for the closed function and barriers and marshals will be set up as deemed necessary.
7. Mauao renewals items identified for action this year include:
 - Visitor counters on summit and base track
 - Tired and troublesome base track pedestrian gates
 - Other items will be managed as part of the unscheduled works.
8. Event requests applications for Mauao and the wider Main Beach and Pilot Bay area over the summer period have ramped up for the summer season. Most of which are common requests or events that have taken place before such as running events around the base track or up to the summit.

- Visitor numbers:



Note: No data for August due to vandalism (repaired this period).

- Volunteers efforts for this period include the ongoing servicing of bait stations by Forest and Bird and Mauao Area Wildlife Trust volunteers and the completion of the annual planting programme by Trees for Survival, Maungatapu primary and Bay of Plenty Polytechnic.



Recommendations

That the Nga Poutiriao o Mauao:

- Receive the Mauao Operational Report September 2015.
- Support staff recommendation to plant memorial Pohutukawa in the vicinity of where s 7(2)(a) - Private was swept away by a wave on 1 October 2014.
- Support staff recommendation to respond to specific requests on a case by case basis.
- Support staff recommendation to work collaboratively with the Department of Conservation to develop some on site interpretation signage regarding the seal population and behaviours for the Mauao base track.



Discussion items

9. [REDACTED] s 7(2)(a) - Privacy has enquired about gaining permission to donate a bench seat or plant some tree/s on Mauao in memory of her son [REDACTED] s 7(2)(a) - Privacy. The operational team acknowledges this is a special case as the event took place on site and recommends planting Pohutukawa in the vicinity of where the event took place.
10. New rules for drones and the implications for Mauao (refer to appendix 1).
11. Tikanga and protocol around the management of seals and marine mammal disposal (refer to Appendix 2).

Attachments

No.	Title
A	Appendix A – New Rules for drones and the implications for Mauao <i>Objective ID: A6594616</i>
B	Appendix B – Tikanga for marine mammal management <i>Objective ID: A6594623</i>

Signatories

Authors	s 7(2)(f)(ii)
Authorisers	s 7(2)(f)(ii)

Appendix 1 – Nga Poutiriao o Mauao Operational report Sept 2015

New Rules for drones and the implications for Mauao

What are the new rules?

The Civil Aviation Authority (CAA) regulates civil aviation in New Zealand, and sets the rules around the use of Remotely Piloted Aircraft Systems: Unmanned Aerial Vehicles (UAV), Unmanned Aerial Systems (UAS), model aircraft and drones.

New rules introduced by the CAA came into effect on 1 August 2015 – these rules require people to obtain approval from the land owner or the occupier of the land before they fly their drone over the area. This rule comes in addition to the existing CAA and Air Traffic Control rules. The CAA rule also says you need to get consent from anyone you want to fly over (this can be given verbally)

What this means?

The Mauao Trust as the owners of Mauao may be asked by drone operators if they can fly their drones above the Maunga. The Trust needs to discuss and decide on how they wish to respond.

As instructed by the Trust, Tauranga City Council has put the following on their website until the Trust has an opportunity to discuss their position:

Mauao (the Mount) is not owned by Tauranga City Council. The Mauao Trust as the owners of Mauao (the Mount) do not give permission for any drones to fly over the Mount

Possible options for consideration

1. Do not give permission for drones to fly over Mauao – blanket refusal
2. Give blanket permission for drones to operate over Mauao
3. Respond to specific requests on a case by case basis

Council's position on Council-owned parks and reserves

The following information is on Council's website

Provided you follow the CAA operating rules you have Tauranga City Council's permission to fly in Council parks and reserves, with the exception of:

- *Memorial Park;*
- *Blake Park;*
- *Council cemeteries; and*
- *any active reserves when organised sports events or training are taking place.*

Council may consider specific requests to fly over these areas.

In addition to the CAA rules Tauranga City Council

- Be courteous of other park users, who often are there for the quiet enjoyment of the park
- Do not operate within 20m of sensitive wildlife habitats, or, nesting or roosting birds, such as the NZ dotterel

- Do not operate during a fire ban period
- Do not overfly adjoining private property without prior consent from the owner/occupier
- Cease operation if requested by Council staff

Any breach of the above conditions could result in termination of your permission to use public land for the above purposes.

The rules and permissions set out on this page do not cover the following:

- Fixed-wing electric-powered model aircraft greater than 1m wing span;
- Gliders greater than 1.5m wingspan and bungee-launched gliders;
- All internal combustion engine (petrol)-powered aircraft; or
- All jet-powered models.

These types of unmanned aircraft can only be flown on private property or officially recognised sites under the control of approved operators, such as model aircraft clubs.

Appendix 2 – Nga Poutiriao o Mauao Operational Report Sept 2015

Tikanga and marine mammal management

Department of Conservation (DOC) s 7(2)(a) - Privacy contacted the board via s 7(2)(a) - Privacy (Chair) to create discussions around tikanga and cultural influence around the management of dead seals. He also requested permission to collect two deceased seal pups for the purpose of a proposed wananga to support the revival of tikanga in the use of seals for traditional raranga practice. At this stage the planned dates are late October to early November 2015. s 7(2)(a) - Privacy concern is that necessary tikanga is not currently followed and he is keen to work with Iwi, Council and partners to improve on this process for next seal season (June – Sept 2016).

Legally DOC is responsible for the management and protection of marine mammals under the Marine Mammals Protection Act 1978. DOC traditionally has a non-intervention approach to let the natural process play out other than assisting mammals that require assistance or euthanasia, if required, due to condition and potential suffering where recovery is not likely.

In high visitor areas such as the coastline of Mauao or Mount main beach deceased seals are removed from where they are discovered and buried near by below the mean high water spring where they can decay naturally in the dune environment. The reasons for doing this due to the smell, potential health hazard issues and sheer number of calls they receive regarding the issue in a high profile location.

Operationally Council's role is about managing access and passing on queries of this nature to DOC if, and when, required. There is an opportunity to partner with key staff and improve on the processes undertaken at Mauao. it should be noted however that this issue is much wider than Mauao and seal numbers are generally on the rise in the Bay of plenty and wider New Zealand.

The majority of calls DOC receives re seals are from miss informed individuals who simply are not used to seeing them behave out of the water and assume they are sick or dying when this is quite normal behaviour. DOC have been working to better educate people so that they will only call when a response is necessary and have indicated interest in a potential interpretation sign around the base track as an ideal opportunity to do so. This would require approval from the board.



Review of the Mauao Historic Reserve Management Plan

Purpose

1. To present the updated Conservation Plan undertaken as part of the review.
2. To seek agreement to Council publicly notifying the intention to review the Mauao Historic Reserve Management Plan.

Executive Summary

3. A review of the Mauao Historic Reserves Management Plan is currently being undertaken as agreed by Nga Poutiriao o Mauao at its meeting on 1 April 2014.
4. A number of specialist assessments were identified as being required to inform the review process. External consultants were engaged to undertake this work. The update of the Conservation Plan has been completed and will be presented.
5. The next step in the process under the Reserves Act 1977 is to notify the public. As the current administering body under the Reserves Act 1977, Council must notify the public of the intent to review the Mauao Historic Reserve Management Plan.

Recommendations

That Nga Poutiriao o Mauao and the Mauao Trust:

- (a) Receives the report.
- (b) Receives the updated Conservation Plan.
- (c) Agrees to Council notifying the intent to review the Mauao Historic Reserve Management Plan and inviting written submissions.

Discussion

6. Nga Poutiriao o Mauao resolved to commence a review of the Mauao Reserve Management Plan (RMP) at its meeting on 1 April 2014.
7. The process for undertaking a review of a Reserve Management Plan is set out in the Reserves Act 1977. An amended process for the review of the Mauao Reserve Management Plan has been developed and forms part of the Memorandum of Understanding between Council and the Mauao Trust. The process recognises the role of the Mauao Trust as having ownership of Mauao and the function of the Mauao Joint Administration Board as the administering body of the reserve.
8. An outline of the remaining steps in the process is included below.



Step	Key Tasks	Indicative Timeframe	Responsibility
1.	Mauao Trust to review Strategic Plan	July-October 2015	Mauao Trust
2.	Joint meeting of Mauao Trust and Joint Board. Agree to notify the intent to review RMP	October 2015	Joint Board
3.	Notify intention to prepare the Mauao Historic Reserve Management Plan and request written comment from interested parties	November/ December 2015	Project team / Council / Joint Board
4.	Undertake community consultation	February - March 2016	
5.	Prepare draft management plan	April - June 2016	Project team
6.	Present draft reserve management plan to the Joint Board for approval	July 2016	Project team
7.	Present draft reserve management plan to the Mauao Trust for approval	July/August 2016	Project team/Joint Board
8.	Present draft reserve management plan to Council for adoption for public consultation	August 2016	Project team/Joint Board
9.	Publicly notify the draft Mauao Historic Reserve Management Plan and request written comment from interested parties – Minimum two month period Hearings Committee structure approved	September – October 2016	Project team Joint Board / Council / Mauao Trust
10.	Collate and review submissions	November – December 2016	Project team
11.	Administering body to establish hearings committee	November - December 2016	Council/Joint Board/Mauao Trust
12.	Prepare project team recommendation report for the Joint Board (Reserves Act hearing process)	December – January 2017	Project team
13.	Reserves Act Hearing and deliberations process	February 2017	Hearings Committee
14.	Make amendments to the draft reserve management plan as a result of hearings and deliberations	March - April 2017	Project team
15.	Present final RMP to Joint Board	April 2017	Project team
16.	Present final RMP to Mauao Trust for Approval	May 2017	Project team/Joint Board
17.	Final adoption of Mauao Historic Reserve Management Plan	May 2017	Council /Joint Board/ DOC

9. Until legislative changes are finalised, the administering body function of the reserve remains with Council, and Council is required by the Reserves Act 1977 to formally notify the intent to review the RMP.

Conservation Plan

10. A number of specialist assessments were identified as being necessary to inform the review of the management plan. This was to ensure that the significance of Mauao as a historic reserve of national importance is not eroded through poor decision



making in both policy development and in maintenance operations. The findings and recommendations of the specialist assessments will ensure decisions made through the review of the management plan are fully and technically informed.

11. The specialist assessments undertaken were:
 - Cultural Values Assessment
 - Ecological Assessment
 - CPTED and Accessibility Assessment
 - Archaeological Assessment
 - Update of the 2004 Conservation Plan
12. The findings of the first three assessments were presented at the 4 December meeting of Nga Poutiriao o Mauao and the Mauao Trust. The findings of the archaeological assessment were presented at the 7 April 2014 meeting.
13. Wildland Consultants Limited developed the first Conservation Plan in 2004. Wildlands was contracted to undertake an update of the Conservation Plan using the four assessments, to plan for the conservation of the cultural, archaeological, and ecological resources and values of the historic reserve. The report is contained in two volumes and attached as Attachment A.

Next Steps

14. Council, as the current administering body, to publically notify the intention to review the Mauao Historic Reserve Management Plan.
15. Engagement with the Mauao Trust, key stakeholders, and the public of Tauranga.

Consideration

Community

16. It is anticipated that there will be a high level of community interest in the review of the Mauao Historic Reserve Management Plan. An engagement plan has been prepared which identifies the intended community engagement approach.

Significance

17. The review of the Mauao Historic Reserve Management Plan is considered of high significance as it will affect a wide range of people and groups who make up the city's community.

Attachments

Attachment A	Conservation Plan Volume 1 and Volume 2 <i>Objective ID: A6581963 and A6581964</i>
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Signatories

Authors	s 7(2)(f)(ii)
Authorisers	Christine Jones, General Manager: Strategy 

**CONSERVATION PLAN FOR
MAUAO HISTORIC RESERVE
2015 - VOLUME 1**



 providing
outstanding
ecological
services to
sustain
and improve our
environments



Wildlands

R3544a

CONSERVATION PLAN FOR MAUAO HISTORIC RESERVE 2015 - VOLUME 1

Contract Report No. 3544a

July 2015

Project Team:

s 7(2)(a) - Privacy

- Project manager, site visit, and report review
Site visit, report revision and update

Prepared for:

Tauranga City Council
Private Bag 12-022
Tauranga

EXECUTIVE SUMMARY

Mauao is a steep-sided rhyolitic lava dome rising 232 m above sea level at the main entrance to Tauranga Harbour. It was inhabited for centuries by tangata whenua¹, who have articulated their connections with waiata, whakataukī, pūrākau, tikanga and tauparapara. Mauao is managed under a joint management arrangement that includes representatives from Ngāi Te Rangi, Ngāti Ranginui, Ngāti Pūkenga, Waitaha and Tauranga City Council.

“The vision of the Mauao Trust, on behalf of the three iwi, seeks to give full expression to the relationship that the whānau, hapū, and iwi of Ngāi Te Rangi, Ngāti Ranginui and Ngāti Pūkenga have with their maunga tapu, maunga rongonui, Mauao” (Boffa Miskell Ltd 2014).

Mauao is a Historic Reserve. It comprises a unique volcanic landform in close proximity to the coast and is a regionally significant landscape feature. Visible surface archaeological features cover most of the summit and the southern slopes of Mauao. The archaeological landscape and associated cultural values of the reserve are of particular importance as are the reasons for the classification of the area as historic reserve. The archaeological sites within the reserve are a non-renewable resource, and they cannot be rebuilt or repaired if damaged or lost. The reserve is managed and conserved in a manner consistent with the cultural and spiritual values of tangata whenua.

Although heavily modified by human activity and related fires, Mauao also retains significant ecological values. These include an important remnant of coastal forest and mainland populations of ōi and kororā. There is considerable scope for ongoing active ecological restoration of Mauao. It has many similarities to some Bay of Plenty islands (c.f. Motuhorā - Whale Island) and it offers substantial opportunities for ecological restoration and nature conservation, in conjunction with ongoing high levels of public usage. The reserve is utilised by large numbers of visitors, estimated at one million per year, who traverse the base circuit track or climb to the summit. As such it is also a regionally important recreational asset and complements other local and regional reserves such as Pāpāmoa Hills Regional Park.

This plan updates the 2004 Conservation Plan and prescribes maintenance and remedial works to continue to assist in the conservation of the archaeological landscape in the Mauao Historic Reserve. The purpose is to care for the archaeological features so that their meaning and importance is conserved and able to be appreciated and interpreted by present and future generations. It also sets out the management required to protect and enhance the significant ecological values currently and potentially present on Mauao. It is critical that the management of cultural values, archaeological heritage, ecological restoration, recreation, and other activities are addressed in an integrated manner.

¹ A glossary of māori names used in this Plan and their english translation is provided in Appendix 11.

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Reviewed and approved for release by:

s 7(2)(a) - Privacy

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1. INTRODUCTION

Mauao Historic Reserve is a steep-sided rhyolitic lava dome rising 232 m above sea level at the main entrance to Tauranga Harbour. It is a prominent and iconic landscape feature. Tangata whenua inhabited Mauao for many centuries and it has very special significance to them. Evidence of Māori occupation is widespread on the summit and the southern slopes, and the archaeological landscape and associated cultural values are of particular importance.

Mauao is protected under the provisions set out in the Mauao Vesting Act 2008¹. The Mauao Trust was established to assist in the management of the Historic Reserve for Ngāi Te Rangi, Ngāti Ranginui and Ngāti Pūkenga. Ngā Poutiriao o Mauao is a joint management committee that includes members of the Trust and appointed representatives from Tauranga City Council.

The archaeological features in the Reserve are archaeological sites, as defined in the Heritage New Zealand Pouhere Taonga Act (2014)², and protected under the provisions of the Act. It is unlawful to modify damage or destroy any archaeological site without prior authority from the Heritage New Zealand³. There are three relevant Māori heritage sites on Mauao listed under the Heritage New Zealand Pouhere Taonga Act 2014. Two of the recorded archaeological sites are Category II registered historic places under Section 23 of the Act - Kinonui Pā (#6403) and Pā (#6401); Mauao (#9423) is classified as a wāhi tapu. Other relevant registered sites include the terraces and midden associated with the Pā, the stone steps, and stone jetty.

Mauao also retains significant ecological values and there is considerable scope for ecological restoration. Protection of archaeological features and associated cultural values, protection and enhancement of landscape values, and the protection and restoration of ecological values need to be addressed in an integrated manner. This plan provides an integrated approach to these matters, recognising exceptional levels of ongoing visitor use that Mauao is subject to.

The reserve is a 'Conservation Zone' in the Tauranga City Plan. Permitted activities in this zone include provision and maintenance of public recreational facilities, informal recreational and leisure activities, and temporary activities and commercial uses.

Initial sections in this Conservation Plan address a vision for management, key resource issues, threats to significant values, and options for future management. This is then followed by sections on management implementation, monitoring, research, and a work plan and timeline. Background resource material, including goals,

¹ By deed dated 2 July 2007, the Mauao Trust was created empowering the trustees of the trust to hold the fee simple estate in Mauao Historic Reserve in trust for Ngāi Te Rangi, Ngāti Ranginui, and Ngāti Pūkenga (<http://www.legislation.govt.nz/act/public/2008/0031/latest/DLM1037702.html>). Management must also be consistent with the requirements of the Reserves Act (1977), which the Mauao Historic Reserve Vesting Act 2008 falls under.

² The Heritage New Zealand Pouhere Taonga Act 2014 replaced the Historic Places Act 1993

³ Applications for modification can be made under the New Zealand Pouhere Taonga Act 2014. Relevant sections have been reproduced in Appendix 9.

objectives, and policies from the 1998 Management Plan and the 2004 Conservation Plan, are presented in a separate companion volume.

This conservation plan should be considered in conjunction with the following companion documents:

- Ecological Assessment of Mauao Historic Reserve (Wildlands 2015);
- Cultural Values Assessment of Mauao Historic Reserve (Boffa Miskell 2014);
- The 2014 archaeological survey report (Phillips 2014);
- Crime Prevention Through Environmental Design (CPTED) and Injury Prevention Through Environmental Design and Universal Access Assessment report (Boffa Miskell 2015);
- Mauao - Mount Maunganui Management Plan (Tauranga District Council 1998). Tauranga City Council, Ngāi Te Rangi, Ngāti Ranginui, Ngāti Pūkenga, and Waitaha are consulting with the wider community with the view to rewriting the Mauao Management Plan in the near future.
- Previous Conservation Plan (Wildland Consultants 2004).

2. VISION¹

Mauao is a significant cultural, traditional, historical, and spiritual site of Ngāi Te Rangi, Ngāti Ranginui, and Ngāti Pūkenga. Waitaha also have an association with Mauao. Aspirations of iwi for Mauao Historic Reserve are detailed in the Cultural Values Assessment (Boffa Miskell 2014) and are reproduced below.

2.1 Vision of Mauao Trust

Kia toitū te mana o ngā iwi o Ngāi Te Rangi, Ngāti Ranginui me Ngāti Pūkenga me o rātou hapū i runga o Mauao.

The vision of the Mauao Trust, on behalf of the three iwi seeks to give full expression to the relationship that the whānau, hapū, and iwi of Ngāi Te Rangi, Ngāti Ranginui and Ngāti Pūkenga have with their maunga tapu, maunga rongonui, Mauao.

The Trust has set out a series of aspirational statements to give effect to the vision. The following sections provide some options for implementing these aspirations.

2.2 Mission of Mauao Trust

The Trust's mission is "*Kia whakatinanatia te mana motuhake me te tino rangatiratanga o Ngāi Te Rangi, Ngāti Ranginui, Ngāti Pūkenga me o rātou hapū ki runga o Mauao*" - To empower the people of Ngāi Te Rangi, Ngāti Ranginui and Ngāti Pūkenga to exercise full ownership rights and tino rangatiratanga over the Mauao Historic Reserve.

¹ The vision and aspirations statements of the Mauao Trust reproduced here are somewhat different to what was presented in the 1998 Management Plan and the 2004 Conservation Plan. The goals, objectives, and policies in the 1998 and 2004 Plans are still considered to be relevant, and are provided in Volume 2 (Appendix 1 and 2) of this plan.

This mission is supported by four aspirations:

- The restoration and protection of the health and wellbeing of Mauao for our future generations;
- Recognition of special relationship iwi have with Mauao;
- To give expression to the relationship of iwi with Mauao;
- Ensuring cultural significance is recognised, provided for, preserved and protected.

The restoration and protection of the health and wellbeing of Mauao for our future generations

Te tiaki me te whakaora of Mauao mo ngā whakatupurangahou.

This aspiration seeks to enhance the natural qualities of the maunga, the strong stone structure, the native bush cloak, and the habitat for native fauna. including fish and shellfish at the coastal edge. This can be achieved through being sensitive to natural features such as outcrops, steep inclines, and rough coastal edges.

The restoring of the cloak of Mauao is a metaphor for the chiefly rangatira status of the maunga. In Tauranga traditions Mauao started out as an unknown hill in the great forest of Hautere. He looked up to the great Ōtānewainuku and beautiful Puwhenua. Mauao has the status of a chiefly mountain, a cloak of native bush will be consistent with the status of the maunga. Replanting much of the maunga with native plants and trees will enhance the mauri of the maunga. The enhanced habitat will attract birds and other native animals. Complemented by a pest management programme the maunga will provide a home for many species, some of whom are considered kaitiaki. The rich tapestry of flora and fauna may facilitate customary harvest by designated whānau (kaitiaki), a sign of mana and prestige for the iwi.

Whānau, hapū and iwi members should play a role in these programmes ensuring continuity of the relationships between people and the environment.

Recognition of special relationship iwi have with Mauao

Kia whakamana, whakahuatia te hononga o te iwi ki te maunga.

The recognition of the special relationship iwi have with Mauao has been somewhat provided for in the vesting of the maunga, establishment of the joint management board and the programme of ongoing activities.

The practical and meaningful expression of this recognition is somewhat based on facilitating opportunities to express the relationship, and supporting those activities. This can be as simple as identifying and providing for a range of ceremonies and events during the year, working with a range of iwi collectives associated with the maunga, for example Te Maunga Mauao Mataitai Reserve (Iwi Committee), Tauranga Moana Kaumatua Forum and Tangata Whenua Collective.

Acknowledgement of the relationship iwi have with Mauao, spiritually, culturally, physically, and emotionally. Giving expression to the ownership and management rights that iwi of Tauranga have, providing for that in a practical and meaningful way.

To give expression to the relationship of iwi with Mauao

Ka puawai te hōhonu me te whai rawa o ngā kōrero me ngā āhutanga ā Mauao.

This aspiration seeks to make opportunities to collect, store, develop and share the memories, stories, traditions, associations and rich history of Mauao among iwi, council, visitors and the Tauranga community. This could be achieved through a dedicated archival, oral history and collection programme, publishing material online and in print, signage, interpretation and education programmes. There is a future generation theme to this aspiration.

There are opportunities to ensure iwi members can engage with their maunga both physically, mentally and spiritually.

Ensuring cultural significance is recognised, provided for, preserved, and protected

Ko Mauao he maunga tapu, kia tūpato.

This aspiration seeks to ensure integrity and respect is afforded to the maunga and iwi regarding all works and activities on the maunga. The maunga is sacred to iwi. There is a strong desire that there are places suitable for open public access and there are places where care and sensitivity is required, and sometimes constrained. These desires need to be articulated and provided for in management plans, annual programmes, staff manuals and training, and implemented on the ground through such things as signage, formal track networks, barriers, monitoring and enforcement.

3. CULTURAL VAUES

The following values statement has been reproduced from the Cultural Values Assessment (Boffa Miskell 2014).

“There are a number of values expressed by iwi that are relatively unchanged over the years. These are derived from traditional views of the Māori world and are influenced by the aspirations to revitalise and preserve core values and principles.

- Mauao is a foundation of identity and mana for Tauranga iwi.
- *Ko Mauao te maunga, Ko Tauranga te Moana* - immediately identifies Tauranga people in time and place.
- Mauao is a metaphor for the permanence of iwi and the intergenerational connection of people, place and time.
- *E papaki kau ana ngā tai ki Mauao* reflects the permanence of the mountain against the tides and natural forces of time.
- *Pororotai, Pororouru* - Mauao is a collection of special places, with a cloak of many colours, shades and form. *He wāhi tapu* - this is a sacred place.

- *Ka hoki koe ki tō maunga, kia purea ake nei i ngā hau o Tāwhirimātea* - Return to your mountain and be revived by the winds of Tāwhirimātea. Mauao is a source of healing and spiritual sustenance for whānau.

The core values underpinning the ongoing management of the maunga are:

Rangatiratanga - the ethic of chieftainship expressed in the ownership arrangement for the historic reserve; the appointment and anointing of elders to carry trusteeship of the maunga.

Mana - the recognition and provision for control and decision-making powers for the management of the maunga.

Kaitiaki - the practical expression of guardianship through dedicated people to look after the day to day activities on the maunga and respond to ceremonial, ritual and traditional activities.

Mauri - putting in place systems, processes and programmes to restore and enhance the life-giving force of the mountain, physically, spiritually and mentally.”

(Boffa Miskell 2014)

4. HISTORIC HERITAGE DESCRIPTION AND SIGNIFICANCE

4.1 History

Tangata whenua inhabited Mauao for centuries and Ngāti Ranginui, Ngāi Te Rangi, Ngāti Pūkenga, and Waitaha all acknowledge the exceptional cultural importance of Mauao, and the ways in which Mauao provides significance to the lives of the individuals, whānau, and hapū of Tauranga Moana. These relationships are an integral part of the cultural whāriki of tangata whenua, are unique to tangata whenua and are not shared - and possibly not fully understood - by other sections of the community.

It is essential that the deep attachment that the tangata whenua of Tauranga Moana have with Mauao is understood and appreciated. Mauao is steeped in legend and occupies a central and very significant place in the tribal histories of the tangata whenua, and is one of the principal ways by which tribal identity and rohe is confirmed.

The cultural history of Mauao has been summarised in the cultural assessment report prepared for Ngā Poutiriao o Mauao. The cultural assessment is a foundation document that provides information to support this Conservation Plan.

4.2 Physical features

An inventory of the archaeological features within the reserve was prepared by Ken Phillips in 2003 (Phillips 2003). In 2014 an inspection and condition assessment of the archaeological features was undertaken (Phillips 2014). The following is a brief summary of the archaeological landscape provided in Phillips 2003.



4.3 Archaeological sites

Mauao Historic Reserve contains an extensive archaeological landscape that covers approximately 40 hectares - refer to Figure 1 (derived from Phillips 2014). There are approximately 800-1,000 visible surface archaeological features within the reserve. These surface features include the components of three pa, plus associated pits, terraces, platforms, house floors, and middens. The shell mounds in the reserve are the only known surviving examples of this type of archaeological feature within the Bay of Plenty.

It must be kept in mind that the surface archaeological features are interconnected by extensive buried archaeological deposits, and that Mauao represents a primarily intact archaeological landscape. The spaces between the surface archaeological features are highly likely to contain intact buried archaeological features.

There are also several archaeological features originating from the post contact or post European period¹. Some of these features, such as the reputed 'military camp' and the stone steps require further archival and archaeological research before their origins, functions, and significance can be fully understood.

4.4 Assessment of historic values

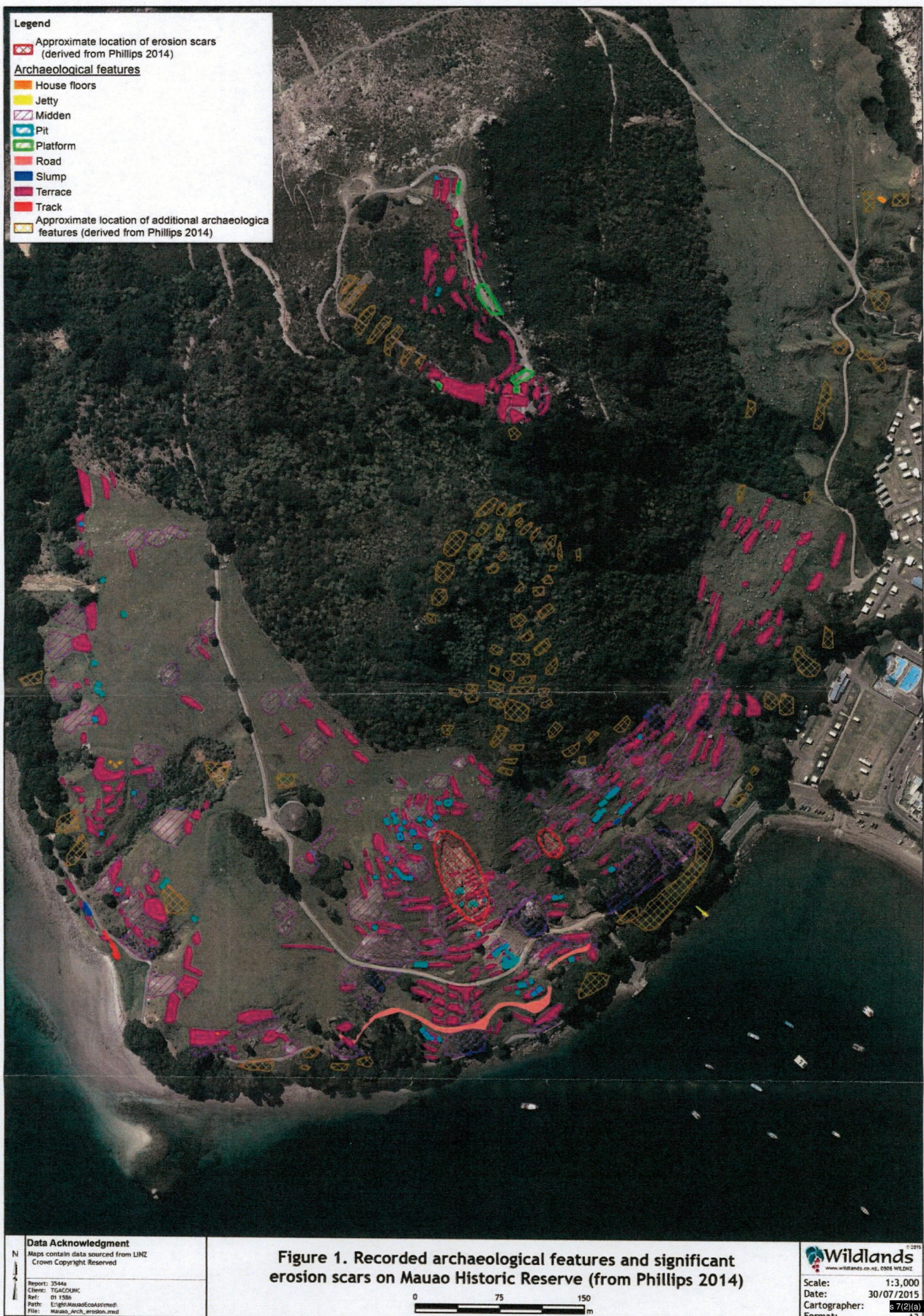
Heritage New Zealand has a statutory role under the Heritage New Zealand Pouhere Taonga Act (2014) to identify places of heritage value, and it has statutory authority in relation to this matter.

The following sections include discussion about the values which collectively underpin the evaluation of significance. It is possible for elements of significance to conflict. For example, the archaeological significance of a place may be defined by its potential to contribute scientific information through invasive excavation. The archaeological significance may however be the antithesis of the cultural significance of a place. The apparent conflict between significance criteria does not however, detract from the contribution each criterion makes to the overall evaluation of heritage value.

4.5 Historical significance

Mauao Historic Reserve has regional historical significance. It is associated with key historical events and individuals and is an integral part of the traditional oral histories of Tauranga Moana. Ngāi Te Rangi, Ngāti Pūkenga, Ngāti Ranginui, and Waitaha all whakapapa to Mauao and articulate their connections within their waiata, whakataukī, pūrākau, tikanga and tauparapara.

¹ 'Post contact' or 'post European' means the archaeological features originate from the period after the arrival of Europeans in New Zealand.



4.6 Archaeological significance

The archaeological and scientific significance of Mauao lies in its potential to contribute information to further the scientific understanding of the history of human occupation. Mauao is also significant as a physical monument of past human habitation. Mauao, as a very large open settlement complex, which also contains areas of fortification, has the potential to provide archaeological information relating to the history of both the Tauranga and wider Bay of Plenty region.

Mauao has national archaeological significance for its potential to contribute to the greater understanding of the development of human settlement patterns, the date and nature of early human settlement, the development of horticulture, and the form and function of large earthwork structures. The shell middens and shell mounds on Mauao are the largest surviving features of their type in the Bay of Plenty Region.

It is arguable that Mauao has international archaeological significance, particularly in relation to its potential to contribute to the wider understanding of the nature of human settlement within Polynesia. It is likely that many of the archaeological features have considerable antiquity, and occupation of Mauao probably spans the full period of human settlement in New Zealand. In particular, the distinct 'open space' features noted by Phillips on the western slopes (Phillips 2003) may provide considerable potential to contribute to the archaeological study of complex social, cultural and political structures.

There has been no systematic archaeological excavation undertaken at Mauao. It is likely that most of the remaining archaeological features are intact and have not suffered major stratigraphic disruption. This adds further to the overall archaeological significance of Mauao.

4.7 Cultural significance and values

Mauao has cultural, traditional, spiritual and social values closely associated with Ngāi Te Rangi, Ngāti Pūkenga, Ngāti Ranginui, and Waitaha. Archaeological features in the reserve must be conserved and managed in a manner consistent with the protection of these values. The cultural assessment completed for Ngā Poutiriao o Mauao identifies various issues and opportunities available.

5. THREATS TO ARCHAEOLOGICAL FEATURES

5.1 General

Threats to archaeological features within the Historic Reserve are principally related to natural processes, human activities, livestock grazing and management, rabbits (*Oryctolagus cuniculus*), information loss, and loss of reserve integrity and setting. Threats from natural processes are related to fire, erosion, and vegetation development. These processes inevitably interact and cannot be considered in isolation. Human impacts can be grouped as visitor impacts, machinery use, and management impacts.

There have been modifications to the physical evidence of past human occupation and use at Mauao. Modifications have occurred as a result of natural and human processes and the successive phases of occupation have undoubtedly resulted in the partial loss of physical features from earlier phases of occupation. Processes and actions which have resulted in the physical modification of features at Mauao include:

- Modification, destruction or loss of features due to overbuilding or landscape modification in subsequent occupation phases;
- Quarrying of midden;
- Access road formation;
- Water supply installations and management;
- Fencing and livestock management installations;
- Livestock grazing and trampling;
- Vegetation growth, tree root intrusion, and inappropriate plantings;
- Track formation;
- Installation of visitor facilities;
- Erosion and water run-off;
- Human foot traffic;
- Burrowing by rabbits.

Avoiding unwarranted and undesirable modification of archaeological features within the reserve is a major objective of this plan. Stabilisation of features and the avoidance of management actions which may result in the further loss of physical features and information are both key considerations.

5.2 Fire

The management of fire is relevant to and important for archaeology, ecological restoration, and all other activities on Mauao. Vegetation fire risk is influenced by a combination of climate, topography, vegetation, and ignition sources.

While a fire may not directly affect archaeological features, subsequent rainfall could damage those features by erosion. Alternatively, strong winds and extended fine weather following a fire is likely to lead to wind erosion. Machinery or firefighting tactics used in rural fire suppression, e.g. earthmoving machinery and fire line construction, can also damage archaeological features.

The risks and potential impacts of vegetation fires is relevant to all management on Mauao. Public safety, fire prevention, and pre-planning for fire control must be given a very high priority.

There has been a long history of fires on Mauao, and future fires are virtually inevitable. This is due to the combined influences of high public usage, light and highly flammable vegetation, free-draining soils¹, high summer temperatures, and dry coastal winds.

¹ The geology, soils, and landform units of Mauao have been described in the 2004 Conservation Plan and are presented in Appendix 3.

Flammable vegetation will always be a risk factor on Mauao, although this risk will reduce somewhat as the existing scrub and shrublands develop into secondary forest. There will be further reduction in fire risk as the existing grassland becomes more dominated by kikuyu (*Cenchrus clandestinum*) over time.

5.3 Erosion

Archaeological sites can be lost or eroded by natural erosion (e.g. along the coast) or through erosion triggered by human activities, such as track construction and maintenance. The southern slopes of Mauao, where most surface features are present, have been affected the most (see Figure 1). Stable slopes on the mid-slope pastoral areas appear to be increasingly affected and historical erosion events on the steep coastal escarpments and spring fed gullies have been less affected by erosion in the past decade. Sub-surface features have been exposed by erosion and slips on the southern slopes. Slip material has buried archaeological features lower down the slope (Phillips 2014).

Erosion on the southern slopes has been attributed to rainfall events but rabbit burrowing and stock tracking may also have been contributing factors.

5.4 Vegetation development

Vegetation, particularly large trees, can damage both surface and sub-surface archaeological features, destroying site information (Bowers 1998). Damage to archaeological features may be caused by root action as trees grow and the roots disrupt the stratigraphic relationship between soil horizons (layers). Damage to surface archaeological features also occurs as trees mature and disrupt the adjacent ground surface. If large trees topple as a result of windthrow further damage to archaeological features may be caused by the root plate being ripped from the ground, and the impact of the falling tree.

The low, dense grassland that covers most of the archaeological features on the southern and western slopes of Mauao provides ideal protection for surface and sub-surface archaeological features. Threats to the current vegetation cover include loss of that vegetation by fire, erosion, over-grazing, rabbit burrowing, or vegetation changes due to successional processes or weed invasion.

5.5 Visitor impacts

A high number of visitors utilise the reserve (approximately 3,500-4,000 per day in the summer months, and in total approximately one million visitors per year) and this is likely to continue to increase with local and regional population growth. Managed recreational use of the reserve is compatible with the conservation of archaeological sites, although many visitor activities have the potential to damage archaeological features. Damage can be caused by informal tracking, vandalism, excavation, bikes, and activities that concentrate large groups of people at specific points, e.g. sporting events, outdoor gatherings and school visits.

However Phillips (Phillips 2014) has indicated that pedestrian activity has had little impact on the archaeological landscape over the past decade. Public generally keep to the existing track and road network and there appears to be little evidence of adverse



effects from those that do traverse off track. Retirement of eroded track sections appeared to have controlled erosion at these sites and on the summit the public appear to keep to existing tracks and previously eroded areas. Ongoing maintenance and management will ensure there are further gains in control of visitor movement.

5.6 Machinery use

Machinery used in association with livestock management, fire control, the establishment and maintenance of tracks and roads, and the placement of interpretation panels and track markers have the ability to damage archaeological features.

Future infrastructure maintenance and construction may negatively affect the archaeological features of Mauao and should only be undertaken in consultation with Heritage New Zealand and monitored by an appropriate archaeological specialist. Archaeological monitoring of disturbed ground provides an opportunity for exposed archaeological features to be examined and researched.

5.7 Reserve management activities

The establishment of tracks, the placement of interpretation panels, track markers, the construction of fence lines and stiles, the placement of troughs for stock water, and inappropriate planting of trees may all inadvertently result in damage to surface or sub-surface archaeological features.

Fencing plans have been established, implemented and maintained under the guidance of Heritage New Zealand. Ongoing assessment, monitoring and revision of these with an approved archaeologist is important; particularly in relation to both stock management and the protection and preservation of archaeological features.

5.8 Grazing

Grazing of livestock, to maintain a protective grass cover on archaeological features, has the potential to seriously damage features through trampling and tracking. The risk to archaeological features posed by livestock grazing must be balanced carefully against the risk to archaeological features caused by a change in the existing vegetation cover.

Grazing (by sheep) is required to maintain the low pasture sward covering most of the archaeological features on the southern and western slopes of Mauao. It is currently the most suitable mechanism to maintain this part of the reserve in a vegetation cover that offers good protection to archaeological features while also providing for public viewing and appreciation of surface features. Management of grazing and associated fencing is a key requirement to stabilise features and reduce the rate of deterioration of archaeological sites on the southern and western slopes of Mauao. Some degree of ground damage due to stock trampling and tracking is always going to occur as a consequence of using grazing animals to maintain a pasture sward. This risk should be managed to restrict damage to areas where archaeological features are not affected.

Animal husbandry and welfare are also important issues. Livestock condition must be able to be maintained or improved. This is particularly important at Mauao due to the

high number of visitors to the reserve, the visibility of the livestock, and likely public concerns about animal welfare.

Damage to archaeological features can be reduced if livestock are managed carefully and monitored closely. Factors that must be considered when grazing livestock on archaeological features include:

- The age, number and species of animals used;
- Seasonal influences;
- The duration and timing of grazing;
- Placement of fences, gates, stiles, and water troughs;
- Animal behaviour (congregation of stock, trampling and tracking);
- Length of grazing rotations;
- Animal welfare and husbandry.

Phillips (2014) considers that stock management on Mauao has improved over the past decade and erosion from stock damage appears to be negligible. Fences protecting exposed middens may require relocation if stock tracking alongside fence are damaging archaeological features.

5.9 Rabbits

Grazing creates a habitat favourable for rabbits, which damage archaeological features by burrowing. The most significant damage to shell middens within the reserve is currently being caused by rabbit burrowing and scratching which breaks the pasture sward and exposes middens. Sheep then graze, camp, or track over these areas, causing further damage and loss of archaeological material. Rabbit damage is the most significant threat to archaeological features on Mauao, and implementation of a rigorous control strategy is urgent (Phillips 2014).

5.10 Information loss

The loss of archived information such as documents, photographs, and unrecorded oral history constitutes a threat to the sustainable management of archaeological features. This material provides a link with the past and is an integral component of the history of the area. Archaeological information can be lost due to ongoing erosion. As sites are eroded the integrity of the stratigraphic relationship of layers within the archaeological features is destroyed, and the opportunity to recover accurate information is lost.

The use of shell as a track aggregate has ceased. Originally shell from middens on Mauao was used to create tracks, and then shell was used from other sources in the region. The shell track aggregate became mixed with shell midden in the vicinity of the tracks. This means that the archaeological information normally able to be recovered from shell middens (by the use of techniques such as radio-carbon dating or the gathering of dietary information) is now unreliable in this part of the reserve.

5.11 Loss of reserve integrity

Intensive urban-based activities adjacent to the reserve may threaten its integrity and setting. Mauao is an historic reserve, yet it is likely that many visitors are unaware of the



historic and cultural values and significance of the place. There is significant potential to increase recognition of the historic and cultural values. Mauao could provide an outstanding example of ongoing recreational use managed compatibly with the protection of historic, cultural, and ecological values.

Methods to address threats to the integrity of the reserve setting and use are discussed in the landscape sections of this plan. Increased awareness of the values of the reserve will assist to preserve the integrity of those values. If reserve visitors are made aware of what is 'special' about the reserve, it is likely that most visitors will take greater care to ensure their actions do not threaten those values.

6. ARCHAEOLOGICAL SITE CONDITION REPORTING

Phillips (2003) undertook the first systematic archaeological survey of Mauao, identified current threats to the continued protection and preservation of the archaeological landscape, and provided general recommendations. The archaeological survey included GPS mapping of the most visible archaeological features within the reserve. This work provided the basis for an archaeological site inspection and condition assessment undertaken in 2014 (Phillips 2014).

Condition reporting for large earthwork structures that are principally archaeological sites is a technique that has been developed through work undertaken by Jones and Simpson (1995), and has been used mainly for conservation plans prepared for the Department of Conservation. The Department of Conservation has also produced guidelines for monitoring the condition of historic places, including archaeological sites (Walton 2003).

It has been found that systematic condition surveys identify factors causing deterioration of an archaeological site and leads directly to actions required to achieve stabilisation of site features. Condition reporting also documents rates of change and indicates methods appropriate to stabilise sites where detrimental changes are occurring.

6.1 Condition overview - November 2014

An archaeological inspection and condition assessment of Mauao Historic Reserve was undertaken in November 2014 (Phillips 2014). A summary statement by Phillips indicates that there have been isolated effects on archaeological features caused from erosion during severe weather events but rabbit damage is more prevalent since 2004 and is causing significant ongoing damage.

Protection and preservation of the archaeological features must also be directed by the cultural values of iwi associated with Mauao as described within the cultural values assessment (Boffa Miskell 2014).



Further detail from the Mauao archaeological inspection and condition report by Phillips (2014) is provided below:

- Erosion - Mid slopes pastoral areas on the southern side of Mauao, that have been stable for the previous 300 years, have suffered from rainfall erosion and slipping. Erosion has damaged or destroyed some surface archaeological features and has exposed a number of subsurface features.
- Pedestrian traffic - Increasing numbers of pedestrian using the track network appears to have had little negative impact on the archaeological features of Mauao. Retirement of the eroded summit track has been successful and the use of previously eroded tracks has not been exacerbated.
- Maintenance/infrastructure - Archaeological features exposed during the installation of a water main in 2010 were investigated and observations recorded. The water main was installed so that no visible surface sign remains.
- Stock management and fencing - Continued sheep grazing to maintain and enhance the archaeological landscape is encouraged. Stock movement along fence line causes minor damage to archaeological features and repositioning of some fences is recommended. Realignment of fence lines that currently intercept archaeological features should be discussed in association with appropriate stock and pasture management.
- Rabbits - Current control of rabbits is not reducing numbers on Mauao, and their impact on the archaeological features on Mauao is considered to be significant. A renewed emphasis on a pest management strategy and implementation is recommended.

7. LANDSCAPE CONTEXT AND MANAGEMENT

Key concepts for the landscape management of Mauao are discussed in this section, including the management of recreational pressure, management of exotic trees, enhancement of indigenous vegetation, management of existing amenity services, and the broad landscape context, which is an essential precursor to further work on landscape protection and enhancement. Future management needs to incorporate all of the identified landscape management issues, along with any others which may assist in the appropriate management of Mauao as a significant archaeological site and recreational destination for residents and visitors to Mount Maunganui.

7.1 Landscape context

When viewed from almost all directions, the junction between the higher slopes of Mauao covered with indigenous vegetation and the lower pastoral slopes occurs at a similar height - around the 80-100 m contour. This flat line in the landscape creates an artificial line in an otherwise natural contrast to the adjacent built up area. A terrain model of Mauao (refer to Figure 2) shows the land cover (based on 2015 Google Earth aerial photographs), the location of archaeological features, and adjoining features.

Remnants of indigenous vegetation tend to find more protection, and therefore have more resilience, in valleys and gullies than on the slopes of hills. When viewed in a broad context, a landscape with indigenous remnants in gully and valley systems appears more natural. At a local scale, indigenous vegetation remnants also have a greater level of resilience in conjunction with water courses. This is partly due to the often sheltered nature of water courses and the general lack of suitability for long-term sustainability of pasture. The identification of areas in the partially sheltered valleys, gullies and water courses on Mauao will highlight sites which are suitable for indigenous vegetation establishment. An obvious constraint to the establishment of vegetation in these areas is the presence of archaeological features. By partitioning off small areas of gullies and water courses adjacent to the existing indigenous vegetation indigenous vegetation establishment can occur on these sites, leading to a higher level of naturalness and aesthetic coherence in the landscape.

7.2 Management context

As a landscape feature, Mauao is undoubtedly outstanding when assessed in the context of Resource Management Act (1991). Various criteria, listed below, provide a benchmark for the assessment of landscape within the context of the Act:

- Natural science factors - the geological, topographical, ecological, and dynamic components of the landscape;
- Aesthetic values - including memorability and naturalness;
- Expressiveness (legibility) - how obviously the landscape demonstrates the formative processes leading to it;
- Transient values - occasional presence of wildlife; or its values at certain times of the day or of the year;
- Whether the values are shared and recognised;
- Value(s) to tangata whenua;
- Historical associations.

Many of these criteria are clearly met and have high values on Mauao. It is simply a matter of the relative value of each criterion. In this particular case, though, it is clearly the protection and maintenance of values associated with the archaeological and landscape features which are of primary concern, in tandem with actual and potential ecological values.

The strong contrast between Mauao and the adjacent heavily built up residential and business areas highlight the discrete landform unit as being both outstanding and appropriately well buffered from the adjacent urban centre.

Sound landscape management principles can help to protect existing archaeological features and indigenous vegetation on Mauao. Control of the very high levels of foot traffic on Mauao will be integral to the protection and enhancement of Mauao for ongoing use and appreciation by high numbers of visitors each month.



7.3 Recreational pressure

An estimated one million visitors to Mauao each year is a clear indication of its popularity as a recreation resource within close proximity to a heavily built up urban area. The pressures associated with this level of use may damage archaeological features that cannot be repaired or replaced. Identification of key pedestrian routes within the reserve have meant that sensitive areas are generally protected from unnecessary damage and visitors are channelled to sites better suited to high levels of foot traffic. Overall Phillips (2014) suggests that the effects on archaeological features from the high level of pedestrian use appear to be negligible.

If additional formal tracks are developed archaeological features could be protected using timber boardwalks to span fragile areas, or geotextile membranes could be used, overlaid with aggregate paths. These techniques may reduce the visibility of some features, but they provide for ongoing channelling of foot traffic, reducing impacts on archaeological features. The nature and extent of the archaeological features will be a key determinant in the protection of those features from any future development and damage. Each new site should be assessed based on specialist archaeological advice, and appropriate landscape management solutions developed. Ongoing track review and monitoring to ensure appropriate track use is important.

Impacts on archaeological features on the summit caused by high visitation numbers can be minimised by the use of imported track materials and the building up of an artificial track surface, rather than cutting into the existing ground surface.

7.4 Exotic tree management

The current Management Plan (Tauranga City Council 1998¹) for Mauao provides a clear intent to protect and enhance the natural character of the reserve. In the context of the Resource Management Act (1991), indigenous plants and fauna are considered to have a higher level of natural character than exotic equivalents. Historically, exotic vegetation has been used on Mauao for screening existing amenities, for erosion control, and for shelter. Exotic trees may be a faster solution for landscape screening in some situations, however a key management objective is to maintain and enhance the natural character of the reserve and the phasing out of exotic trees and replacement with suitable native species is clearly appropriate. This approach can be used in conjunction with other methods to reduce the prominence of existing amenities, e.g. painting the existing infrastructure to colours more appropriately landscape sensitive.

By continuing to phase out exotic trees² and replace them with indigenous species, the natural character and indigenous restoration efforts will be enhanced. Reducing competition from weed species is an essential prerequisite for the restoration of indigenous vegetation.

¹ Tauranga City Council, Ngāi Te Rangi, Ngāti Ranginui, Ngāti Pūkenga, and Waitaha are consulting with the wider community with the view to rewriting the Mauao Management Plan in the near future.

² Consultation may be required to determine the historic significance of any old exotic specimen trees.



Where large exotic trees are removed and replaced with potentially large indigenous specimens; the replacement tree should be planted in the immediate vicinity of the former tree's root plate. This will reduce the probability of new disturbance to intact archaeological deposits, because new tree root action will be concentrated in the area already disturbed by the growth of the previous tree.

7.5 Indigenous vegetation management

Establishment of indigenous vegetation can assist in the achievement of many of the management objectives for Mauao. Enhancement of natural character is an obvious benefit from the establishment of further indigenous vegetation. Other benefits which aren't so obvious, but are also relevant, include:

- The control of pedestrian traffic (use of prescribed Crime Prevention Through Environmental Design (CPTED) planting in appropriate places will also reduce any perceived fear or perceived incidences of crime on the maunga);
- The re-establishment of a natural vegetation edge for existing areas of native vegetation;
- The stabilisation of erosion-prone slopes;
- The screening and enhancement of existing amenities, wāhi tapu, and other important sites;
- Support the intent of tangata whenua to enhance the mauri of the maunga.

7.6 Other landscape management issues

Although the stockyards are outside the Mauao Historic Reserve cadastral boundary consideration should be given to screening this area from the public below to provide an increased perception of the naturalness of the maunga.

8. VEGETATION

8.1 Pre-human

Prior to human occupation Mauao would have been covered almost entirely with coastal forest dominated by pōhutukawa (*Metrosideros excelsa*), pūriri (*Vitex lucens*), karaka (*Corynocarpus laevigatus*), ngaio (*Myoporum laetum*), houpara (*Pittosporum crassifolium*), and kānuka (*Kunzea robusta*), and shrubs or small trees of karo (*Pittosporum crassifolium*), houpara, māpou (*Myrsine australis*), whau (*Entelea arborescens*), and nikau (*Rhopalostylis sapida*). There are also likely to have been local occurrences of rimu (*Dacrydium cupressinum*), northern rātā (*Metrosideros robusta*), tawa (*Beilschmiedia tawa*), hīnau (*Elaeocarpus dentatus*), rewarewa (*Knightia excelsa*), mangeao (*Litsea calicaris*), and kamahi (*Weinmannia racemosa*). Specialist species, such as *Euphorbia glauca*, would have been present on bluffs, beaches, coastal rocks and seepages.



8.2 Human-induced change

People lived on Mauao for many centuries and they had a dramatic effect on the vegetation:

"The most elaborate fortified sites in the region were at Maunganui, Mangatawa and on the hills at Pāpāmoa. Maunganui, an isolated mount protected by the sea on all sides except the narrow sandy isthmus to the east, was an ideal site for a large fortified village. The main village was on the south side and the remnants of extensive terracing and numerous middens testify to its long occupation."

(Stokes 1980)

Fire will have been an important factor in the ecology of Mauao since human occupation and there may have been occasional natural fires prior to human arrival. Natural vegetation is rarely static but the frequency of post-human arrival fire has had negative impacts on both vegetation and fauna. The original vegetation will have been cleared at an early stage, and fire would have been used repeatedly to keep Mauao relatively open. Pre-European vegetation was mapped as "fern and mānuka (*Leptospermum scoparium*) scrub" (Stokes 1980). A large fire was reported in November 1842 (Cunningham and Musgrave 1989) and an 1858 illustration shows the southern and western slopes devoid of heavy vegetation (Plate 1 in Wildland Consultants 1999). Oblique photographs of the eastern slopes of Mauao in 1929, 1940s, and 1960 are also presented in Wildland Consultants (1999). In 1929 the vegetation was low but by the 1940s pines were well established and were very prominent by 1960.

From analysis of aerial photographs from 1943 to 1999 it is evident that fire has affected the vegetation of parts of Mauao at reasonably regular intervals over the last 60 or so years. Evidence of most recent fire-related vegetation change is confined to the northern flanks of Mauao, with a different extent affected within the same general area by each episode. Most of the indigenous-dominant vegetation on the southern and western slopes has not been affected by fire since 1943, probably reflecting the slightly damper environment on these slopes and the lower flammability of the more advanced vegetation successions. In the 1943 aerial photograph earlier successional vegetation is evident over a reasonably large area (Wildland Consultants 1999). There is no evidence of fire between 1943 and 1959, as shown by a large increase in the numbers of pines (*Pinus* sp.) in the vicinity of the summit and in the area affected by fire prior to 1943.

From interpretation of aerial photographs taken in 1977 it appears that between 1959 and 1977 only a restricted area on the upper northern slopes was affected by fire. However, Cunningham and Musgrave (1989) noted that "fires in the mid-1960s were particularly severe" and that the road to the summit was constructed in the late 1960s to provide vehicle access for firefighting.

The 1996 aerial photograph shows evidence of an earlier major fire and this is supported by an article in the Bay of Plenty Times Supplement (26 May 1987) which documents a planting expedition in response to a "disastrous fire early this year". The area affected by this fire was still clearly evident on the 1996 aerial photograph, with a large area of gorse (*Ulex europaeus*)-dominant vegetation. There was a major fire in



December 1997 which burnt nearly all of the gorse-dominant vegetation and also some vegetation that was not burnt in 1987.

From comparison of the 1943 and 1999 vegetation maps it is apparent that there have been significant changes to the vegetation over the last 56 years. Major changes are summarised below:

- Much of the scrub on the western and southern slopes in 1943 has developed into treefernland, treeland, and forest.
- The area of pasture has diminished.
- Exotic treeland is no longer present on upper slopes.
- The restricted area of pōhutukawa treeland and forest present along the western slopes in 1943 has developed into a larger area of indigenous forest.
- The extent of pōhutukawa treeland on the coastal margin has increased.

Recent fires on Mauao, with the notable exception of the two most recent ones, appear to have occurred at 10-15 year intervals (pre-1943, mid-1960s, 1987, 1997, 2003), and have all occurred in the same general area; on the northern slopes. The January 2003 fire destroyed an extensive area of vegetation on the northern slopes.

8.3 Present day vegetation

Vegetation and habitats on Mauao comprise a mosaic of vegetation types including regenerating forest, scrub, shrubland, and grazed pasture, with small pockets of remnant indigenous vegetation (predominantly large, old pōhutukawa). Sixteen broad vegetation and habitat types were identified and mapped in November 2014 (see Figure 3, derived from Wildland Consultants 2015) and are listed below. Full descriptions of each type are presented in Appendix 4, a list of vascular plant species recorded on Mauao is presented in Appendix 5 and a glossary of plant names in Appendix 10.

1. Pōhutukawa forest (8.0 ha)
2. Pōhutukawa/māhoe-mamaku-hangehange forest (12.7 ha)
3. Mānuka-(Spanish heath)-(wharariki) shrubland (6.3 ha)
4. Mixed exotic-indigenous scrub and shrubland (2.8 ha)
5. Māhoe forest and scrub (2.8 ha)
6. Pōhutukawa-mixed indigenous species forest, treeland, and scrub (3.8 ha)
7. Planted indigenous species forest/treeland/scrub/shrubland (4.8 ha)
8. Pōhutukawa treeland (2.7 ha)
9. Mixed indigenous species scrub (1.8 ha)
10. Mixed exotic and indigenous species forest and treeland (2.4 ha)
11. Rocky bluffs (1.0 ha)
12. Close-cropped grassland and paths (0.8 ha)
13. Rocky promontory (0.2 ha)
14. (Wīwī)/bracken-pōhuehue-cocksfoot shrub-grassland (0.1 ha)
15. Shallow gully (<0.1 ha)
16. Pasture (26.1 ha)



8.4 Vegetation succession

In 1999 large dead gorse was present in the understorey of many of the secondary indigenous vegetation types indicating that over time an indigenous canopy has developed through the gorse. It is also evident that a range of indigenous species have established within stands of gorse. If fire can be prevented, natural regeneration and succession will proceed relatively rapidly on sites without domestic stock. The relatively rapid rate of this succession is indicated by the significant degree of change between 1943 and 1999. A key element for the successful revegetation of Mauao is to allow and encourage this naturally rapid rate of vegetation development. Pōhutukawa should continue to be a prominent element on Mauao and it is a key component in the planting schedules provided below.

8.5 Grazing

It is not clear when grazing of domestic stock was first undertaken on Mauao but it was most likely early last century or even the later part of the 1800s. An undated manuscript held in the Tauranga Library ("Taina" - Visions of Boyhood) relates to early childhood and notes that "mānuka clad its upper slopes, with many magnificent pōhutukawa and karaka in groves, or clinging above the rocky shores". It also records an observation of a "boundary rider whose job was to keep the cattle that grazed the Mount from straying".

A 1930 photograph in Cunningham and Musgrave (1989) appears to show low vegetation only over the eastern slopes, and pasture was present on the lower slopes in the early 1930s (W.T. Davies pers. comm. 2004). At that time the 'scrub line' was apparently similar to the present day, and rabbits were abundant in the grassland.

8.6 Tracks and planting

The summit track was built in 1898 (Bellamy 1982) and there has been a long history of planting, extending back to the 1880s (Cunningham and Musgrave 1989) and the early 1900s (Bellamy 1982). Apparently many of the 1880 plantings were destroyed by fire (Cunningham and Musgrave 1989). These later authors also note that there were regular Arbor Day excursions from Tauranga in the late 1880s to plant trees, including one led by a J.C. Adams who also took scouts to the summit and had them use catapults to scatter karaka berries in all directions!

8.7 Flora

The flora of Mauao includes at least 345 species, of which 165 are indigenous and 180 are adventive (Appendix 5). Of the 165 indigenous species recorded from Mauao, three are considered to be Threatened or At Risk nationally (de Lange *et al.* 2013): Holloway's crystalwort (*Atriplex hollowayi*) (Threatened-Nationally Critical), *Pimelea tomentosa* (Threatened-Nationally Vulnerable), and native spinach (*Tetragonia tetragonioides*) (At Risk-Naturally Uncommon). Only one of these was seen during the 2014 survey - native spinach was observed on the southern sandy



Legend

 Project area boundary

Vegetation and habitat types

- 1a-c. Pōhutukawa forest
- 2. Pōhutukawa/māhoe-mamaku-hangehange forest
- 3. Mānuka-(Spanish heath)-(wharariki) shrubland
- 4. Mixed exotic-indigenous scrub and shrubland
- 5. Māhoe forest and scrub
- 6. Pōhutukawa-mixed indigenous species forest, treeland, and scrub

7a-g. Planted indigenous species forest/scrub/treeland/shrubland

8. Pōhutukawa treeland

9. Mixed indigenous species scrub

10a-d. Mixed exotic and indigenous species forest and treeland

11. Rocky bluffs

12. Close-cropped grassland and paths

13. Rocky promontory

14. (Wīwī)/bracken-pōhuehue-cocksfoot shrub-grassland

15. Shallow gully

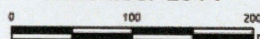
16. Pasture

Data Acknowledgment

Raps contains data sourced from LINZ
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Report: 3066
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Figure 3. Vegetation and habitat types on Mauao, November 2014



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Scale: 1:4,000
Date: 29/07/2015
Cartographer: S 7(2)(d)
Format: A3

beach beneath pōhutukawa. *Pimelea tomentosa* was not seen during the current survey and was last reported from Mauao in 2004. The record of Holloway's crystalwort (Beadel *et al.* 2009) is a historic record, and this species is not currently present.

Several species that are regionally uncommon in the Bay of Plenty Region (as per Beadel 2009) are present on Mauao. *Astelia banksii* is present on the western and northern lower slopes beneath pōhutukawa forest. *Lepidosperma laterale* is present within indigenous forest and scrub on the southern slopes of Mauao. This species is near its southern limit, and is found at only two other sites in the Bay of Plenty Region (Wildland Consultants 2008). *Oxalis rubens* is present on the eastern, coastal fringe of Mauao beneath pōhutukawa treeland. *Psilotum nudum* is present on the rock bluffs on the north-western side of Mauao, which is one of the few known coastal occurrences of this species in the Bay of Plenty (Wildland Consultants 2008). *Tetraria capillaris* is present on the margins of secondary scrub on the northern upper slopes of Mauao. *Zoysia pauciflora* is present just above the small saltmarsh herbfields on the rocky margins on the north-eastern side of Mauao.

Mangemange (*Lygodium articulatum*), whilst not regionally uncommon, is of very limited distribution in Tauranga Ecological District and is only known to be present in the District on Mauao.

Of the 180 adventive species, five are historical records that have not been observed on Mauao since 1984 (Wilcox and Ecroyd 1984) and some or all of these five species may no longer be present. The large range of species reflects the wide range of habitats present, ranging from rocky foreshore, to gentle hill slopes, to cliffs. Exotic species also occur widely in most of these habitats, in part due to the history of disturbance on Mauao, and also the close proximity to an urban centre. Twenty-five species present are listed in the Bay of Plenty Regional Pest Management Plan, and a further 30 are considered environmental weeds that should be controlled for indigenous biodiversity values. The distribution, abundance, and priority status for control of these species on Mauao is described in greater detail below.

8.8 Environmental weeds

Fifty-four adventive plant species considered to be environmental weeds have been recorded on Mauao. Nineteen of these species are listed in the Bay of Plenty Regional Pest Management Plan (Bay of Plenty Regional Council 2011) (Table 1 and mapped in Figure 4). Two species, buddleia (*Buddleja davidii*) and Khasia berry (*Cotoneaster simonsii*), have not been recorded since 1984 (Wilcox and Ecroyd 1984) and are unlikely to still be present.

Table 1: Environmental weeds recorded on Mauao, their status in the Bay of Plenty Regional Pest Management Plan, and relative priorities for control¹.

Key: * Distribution mapped on Figure 4.

Scientific Name	Common Name	RPMP Status	Priority for Control
<i>Acacia mearnsii</i>	Black wattle*		High
<i>Ailanthus altissima</i>	Tree of heaven*	Restricted pest	High
<i>Arctotheca calendula</i>	Cape daisy*		High
<i>Asparagus asparagoides</i>	Smilax*	Restricted pest	High
<i>Asparagus scandens</i>	Climbing asparagus*	Restricted pest	High
<i>Chrysanthemoides monilifera</i>	Boneseed*	Containment pest	High
<i>Cortaderia jubata</i>	Purple pampas	Restricted pest	High
<i>Cortaderia selloana</i>	Pampas*	Restricted pest	High
<i>Cotoneaster glaucophyllus</i>	Cotoneaster*		High
<i>Crataegus monogyna</i>	Hawthorn*		High
<i>Eriobotrya japonica</i>	Loquat*		High
<i>Delairea odorata</i>	German ivy		High
<i>Dipogon lignosus</i>	Mile-a-minute	Restricted pest	High
<i>Euyonomus japonicus</i>	Japanese spindleberry*	Restricted pest	High
<i>Gomphocarpus fruticosus</i>	Swan plant*		High
<i>Hakea sericea</i>	Prickly hakea		High
<i>Hedera helix</i>	Ivy		High
<i>Hedychium gardnerianum</i>	Kahili ginger*	Containment pest	High
<i>Ligustrum lucidum</i>	Tree privet*	Restricted pest	High
<i>Ligustrum sinense</i>	Chinese privet*	Restricted pest	High
<i>Lonicera japonica</i>	Japanese honeysuckle*	Restricted pest	High
<i>Lycium ferocissimum</i>	Boxthorn*		High
<i>Metrosideros excelsa</i> × <i>M. kermadecensis</i>	Pōhutukawa × Kermadec pōhutukawa*		High
<i>Paraserianthes lophantha</i>	Brush wattle*		High
<i>Passiflora edulis</i>	Black passionfruit		High
<i>Phoenix canariensis</i>	Phoenix palm*		High
<i>Pinus pinaster</i>	Maritime pine	Restricted pest	High
<i>Pinus radiata</i>	Radiata pine*	Restricted pest	High
<i>Pinus species</i>	Wilding pine*	Restricted pest	High
<i>Rhanmus alternus</i>	Italian evergreen buckthorn*		High
<i>Senecio angulatus</i>	Cape ivy		High
<i>Solanum mauritianum</i>	Woolly nightshade*	Containment pest	High
<i>Trachycarpus fortunei</i>	Chinese windmill palm*	Restricted pest	High
<i>Tradescantia fluminensis</i>	Tradescantia	Restricted pest	High
<i>Acacia dealbata</i>	Silver wattle		Medium
<i>Berberis glaucocarpa</i>	Barberry		Medium
<i>Erica lusitanica</i>	Spanish heath*		Medium
<i>Hakea salicifolia</i>	Willow-leaved hakea		Medium
<i>Rosa rubiginosa</i>	Sweet briar*		Medium
<i>Rubus fruticosus</i>	Blackberry*		Medium
<i>Acer pseudoplatanus</i>	Sycamore maple		Low
<i>Alnus glutinosa</i>	Common alder		Low
<i>Chamaecytisus palmensis</i>	Tree lucerne		Low
<i>Cornus capitata</i>	Strawberry dogwood*		Low
<i>Erigeron karvinskianus</i>	Mexican daisy*		Low
<i>Lupinus arboreus</i>	Lupin		Low
<i>Miscanthus nepalensis</i>	Himalaya fairy grass		Low
<i>Nerium oleander</i>	Oleander		Low
<i>Quercus robur</i>	English oak*		Low
<i>Roldana petasitis</i>	Velvet groundsel		Low
<i>Solanum marginatum</i>	White-edged nightshade		Low
<i>Teline monspessulana</i>	Montpellier broom*		Low
<i>Ulex europaeus</i>	Gorse*	Containment pest	Low
<i>Yucca gloriosa</i>	Yucca*		Low

¹ Priorities for control are further discussed in Section 10.5.1 of this Plan.





8.9 Previous vegetation restoration/enhancement projects

Since the early 20th century there have been numerous attempts to beautify or enhance Mauao by the clearing of “weed” species and the planting of other exotic species. Plantings of hawthorn (*Crataegus monogyna*), several pine species (*Pinus* spp.), sycamore (*Acer pseudoplatanus*), eucalyptus (*Eucalyptus* sp.), and poplar (*Populus* spp.) have also occurred, although the purpose of most of these plantings is not known (Tauranga District Council 1998). Over the past 120 years there also have been attempts to restore the native vegetation on Mauao, and this has included planting of tōtara (*Podocarpus totara*), ngaio, kauri (*Agathis australis*) (probably not found naturally on Mauao), and pōhutukawa, scattering of karaka berries as well as planting them, and distribution of seed of a variety of species (Wildland Consultants 1999).

The regular occurrence of major fires on Mauao has kept large areas of the northern and eastern slopes open, or covered in a low scrub that has been dominated by gorse (Wilcox and Ecroyd 1984) and pampas (*Cortaderia selloana*) (Wildland Consultants 1999). The prevalence of these two species is due to their ability to spread highly viable seed rapidly, and their tolerance of extremely dry conditions. Over recent years attempts have been made to clear and restore some of the areas dominated by gorse and pampas, by herbicide treatment of both species and planting the area with natives such as mānuka and kānuka, along with a variety of other shrub species.

Possums (*Trichosurus vulpecula*) and rabbits are the greatest mammalian threats to indigenous vegetation. Possums damage the crowns and young shoots of established trees, especially vulnerable species such as pōhutukawa, as well as browsing seedlings and saplings. Possum numbers on Mauao are low (Wildland Consultants 2015). Rabbits graze seedlings of any palatable species, especially in open areas and are very common on Mauao (Wildland Consultants 2015).

8.10 Future vegetation management

Vegetation management must be integrated with other key uses of the reserve, such as protection of archaeological features, protection of wāhi tapu, restoration of areas damaged by fire, landscape management, visitor management, and fauna management. Key issues are:

- Protection and/or enhancement of wāhi tapu sites using indigenous plantings to either restrict public access to selected areas, or, to increase public awareness.
- Protection of existing areas of indigenous vegetation, while recognising that some local management of vegetation development may be required to protect significant archaeological features.
- Re-establishment of indigenous vegetation on areas recently damaged by fire, without creating increased fire risk.
- Creation of a linked margin of pōhutukawa-dominant forest around the base of Mauao.

- Localised planting to 'soften' existing straight vegetation boundaries that cut across the mid-slopes of Mauao.
- Retention of pasture in key areas of archaeological landscape.
- The staged removal of planted and wilding exotic trees.
- An ongoing need for the control of a diverse suite of invasive environmental weeds.
- The need for ongoing monitoring of vegetation extent and condition, and weeds.
- The need for ongoing review of vegetation management.

9. FAUNA

9.1 Avifauna

Mauao supports a wide range of terrestrial and coastal birds (Appendix 7). There are three groups of bird species that utilise the site:

- Seabirds that roost and/or breed on Mauao, e.g. kororā (northern blue penguin; *Eudyptula minor iredalei*), ōi (grey-faced petrel; *Pterodroma macroptera gouldi*) and pied shag (*Phalacrocorax varius varius*).
- Land and bush birds that reside on Mauao, e.g. spur-winged plover (*Vanellus miles*) and North Island fantail (piwakawaka; *Rhipidura fuliginosa placabilis*).
- Seasonal or irregular visitors, e.g. shining cuckoo (pipiwhauraroa *Chrysococcyx lucidus*), pihoihoi (New Zealand pipit; *Anthus novaeseelandiae*), reef heron (*Egretta sacra sacra*), and kārearea (New Zealand falcon; *Falco novaeseelandiae*).

Mauao is important for two seabird species that breed here - kororā and ōi. The following describes the local populations.

Kororā (blue penguin)

Kororā are classified as At Risk-Declining (Robertson *et al.* 2013). Three key sites are present within the Tauranga area: Mauao, Moturiki (Leisure Island), and Motuotau (Rabbit Island). These sites are thought to support c.300 pairs, c.100 pairs, and c.200 pairs respectively (Dave Richards, pers. comm., in Sievwright 2014). Seventy-four occupied burrows were found on Mauao during a Masters research programme in 2012-2013 (Siewwright 2014). The distribution of kororā is relatively continuous around Mauao and burrows are primarily within c.10 m or so of Mean High Water Spring (MHWS). However, some burrows are present in the forest and grasslands of the lower slopes, and were possibly originally constructed by rabbits (Winter 2000).



Ōi (grey-faced petrel)

Ōi are classified as Not Threatened (Robertson *et al.* 2013). However, colonies of burrowing petrels are very rare on the New Zealand mainland due to the presence of mammalian predators. As such, the presence of ōi on Mauao is ecologically significant. Colonies are also present on Motuotau (Jones *et al.* 2011) and Motuhorā (Whale Island), with the population on Motuhorā estimated to number c.95,000 pairs in 2003 (Imber *et al.* 2003). On Mauao, ōi burrows are found on the lower slopes in areas of pōhutukawa forest/treeland with some burrows occurring in grazed pasture. The colony has approximately 200 pairs of birds.

Other Bird Species

A further 11 indigenous and 13 introduced bird species were recorded during the 2014 field survey of Mauao (Wildland Consultants 2015). A pied shag (*Phalacrocorax varius varius*; Threatened-Nationally Vulnerable) colony (up to ten nests; Cuming 2008 in Beca 2014) is present in pōhutukawa forest near the base track on the north-western side. No other At Risk or Threatened bird species were recorded during the 2014 survey.

Terrestrial indigenous bird species recorded on Mauao are all relatively common, regionally and nationally, and are all species that are able to survive in the presence of introduced mammalian predators. Nevertheless, relative breeding success would improve if a more effective mammal pest control was to be undertaken across relevant habitats.

9.2 Reptiles

Information on reptile populations on Mauao is sparse and herpetofauna have not been formally surveyed. Shore skinks have been recorded from Mauao, but are present at low abundance (Wildland Consultants 2008). A copper skink (*Oligosoma aeneum*) was caught on Motuotau (c.1.5 km to the east) in 2012 (Mauao Wildlife Trust, <http://mauaowildlife.org/wildlife/reptiles.html>) and this species could also be present on Mauao. Areas of kānuka may support geckos (*Hoplodactylus* spp. or *Nautilinus* spp.) and other skink species may be present along the shoreline or within areas of indigenous vegetation.

9.3 Indigenous mammals

The only indigenous mammal species that occurs regularly at Mauao is the New Zealand fur seal (*Arctocephalus forsteri*; not threatened) and increasing numbers of seals are using Mauao as a haul-out site (Wildland Consultants 2008).

9.4 Management options for fauna

Avifauna

Mauao has the potential to support a much larger population of burrowing seabirds than it does at present. The ōi population is likely to be significantly restricted by predation by rats, mustelids, and cats, and possibly disturbance by people. On islands

where rats have been eradicated, the ōi population has increased significantly. A site the size of Mauao has the potential to support several thousand breeding pairs, assuming that most of the habitat available is suitable for burrowing.

In addition to ōi, adjacent islands support Pycroft's petrel (*Pterodroma pycrofti*; At Risk-Recovering¹), fluttering shearwater (*Puffinus gavia*; At Risk-Relict), North Island little shearwater (*Puffinus assimilis haurakiensis*; At Risk-Recovering), northern diving petrel (*Pelecanoides urinatrix urinatrix*; At Risk-Relict), New Zealand white-faced storm petrel (*Pelagodroma marina maoriana*; At Risk-Relict), and flesh-footed shearwater (*Puffinus carneipus*; Threatened-Nationally Vulnerable). Several of these species have been successfully attracted and/or translocated to protected mainland sites. In time, such species could be considered for re-establishment or introduction on Mauao (several may well have been present in the past). Introductions need not be prohibitively expensive (e.g. translocations), but can use comparatively cheap techniques such as acoustic attraction (although these are not always successful). However, it would not be advisable to attempt this until mammal pest control has been successful and increases in the existing ōi population demonstrated.

Likewise, Mauao may be able to support an increased number of kororā pairs with sustained mammal pest control, particularly if the availability of suitable breeding habitat is increased through planting.

However, management of the existing seabird population at Mauao is the highest priority for avifauna. This will need to involve intensive pest mammal control and monitoring of the kororā and ōi population numbers and productivity. Observed, sustained, increases in breeding pairs of ōi and associated low indexes of mammalian predators should be considered to be indicative of successful management and, at this point, translocations or attraction of other seabird species can be considered.

Herpetofauna

It is suggested that a suitably-qualified herpetologist is engaged to undertake a thorough herpetological survey of Mauao, as the presence of indigenous reptile species may need to be addressed in future management.

10. MANAGEMENT IMPLEMENTATION

10.1 Cultural values

An assessment of cultural values has been undertaken (Boffa Miskell 2014)². The values and aspirations of tangata whenua are clearly outlined and supported by a summary of oral and documented whakapapa, history and tribal relationships. Numerous issues and opportunities for the cultural values management of Mauao have been discussed and presented. Some of the issues have been reiterated within this document but ongoing consultation with Tauranga City Council and Heritage

¹ All bird species have been classified as per Robertson *et al.* 2013.

² Tangata whenua issues described in the 1998 Management Plan are presented in Appendix 8.

New Zealand will be required so as to achieve appropriate outcomes. Appendix 1 of the assessment report details the specific matters, and these are summarised below:

Significant Cultural Value Issues

- i. The lack of cultural interpretation and elements that expresses the special relationship between tangata whenua and Mauao.
- ii. Natural erosion and the effects of high visitation on physical elements of pā and occupation areas.
- iii. The lack of detailed understanding of the settlement pattern and traditional ways of life on Mauao.
- iv. The poor condition of sacred springs.
- v. The lack of a coherent and enforceable position on acceptability or unacceptability of commercial activities.
- vi. Balancing tension between open space, pasture, and native vegetation.
- vii. Iwi wish for the removal of infrastructure (water reservoir, trig).
- viii. Proactive management of depositories of human remains to prevent accidental discovery and fossicking.

Significant Cultural Value Opportunities

- ix. Coherent, consistent, effective and meaningful interpretation and signage across the maunga.
- x. Opportunities to restore the *korowai o Mauao* through conservation programmes and planting projects.
- xi. Specific projects to enhance the rangatiratanga, mana, kaitiaki and mauri of Mauao and including iwi education.
- xii. Conducting archaeological and other research to better understand the former settlement pattern and lifestyle of the ancestors who resided at Mauao.

10.2 Archaeological management standards

The following management standards should be applied in the reserve, to ensure the ongoing protection, conservation, and appreciation of this very significant cultural landscape.

10.2.1 Legal requirements

All management and conservation work must comply with the requirements of the Heritage New Zealand Pouhere Taonga Act (2014). It is unlawful to modify, damage or destroy any archaeological sites without prior authority from Heritage New Zealand. Management must also be consistent with the requirements of the Reserves Act (1977), which the Mauao Historic Reserve Vesting Act 2008 falls under.

Ngā Poutiriao o Mauao should pursue registration of the entire Mauao Historic Reserve as an historic area through the provisions of the Heritage New Zealand Pouhere Taonga

Act (2014), in recognition of the significance of the cultural and archaeological landscape. Some of the archaeological sites within the reserve are currently registered under the Act as Category II historic places (places of historical or cultural heritage significance or value). Ngā Poutiriao o Mauao should continue to pursue the upgrading of the registration status of these sites to Category I (places of special or outstanding historical or cultural heritage significance or value), to reflect the particularly high significance of Mauao in terms of both historic and cultural values.

The recognition of Mauao Historic Reserve as a World Heritage Site for its significant archaeological, cultural, and historic values has been investigated and it does not meet the specific criterion. However this should be revisited as qualification criteria may change overtime.

10.2.2 Standards of conservation

The international organisation which develops cultural heritage conservation policies is ICOMOS, the International Council on Monuments and Sites. All conservation work in the Mauao Historic Reserve should be guided by a plan consistent with the principles of the ICOMOS New Zealand Charter for the Conservation of Places of Cultural Heritage Value (ICOMOS New Zealand Charter 2010).

10.2.3 Specialist advice

Planning for conservation work should be based on adequate and reliable information being first obtained and critically analysed. Specific projects and work within the reserve will require input from people with specialist skills. Skills or knowledge of particular relevance include: tangata whenua, archaeology, conservation of historic stone structures, agricultural and livestock management, archival research, visitor management, interpretation, structural engineering, rural fire management, plant ecology (including in-depth knowledge of invasive weeds), and fauna ecology (including ecological restoration).

10.2.4 Intervention

All reserve management activities (including grazing) should be undertaken to ensure the minimum possible intervention with archaeological features, as they presently exist. Increasing levels of intervention are defined by ICOMOS as: (i) preservation, through stabilisation, maintenance, or repair; (ii) restoration, through reassembly, reinstatement, or removal; (iii) reconstruction; and (iv) adaptation.

Any new elements that are introduced into the ground subsurface, such as new fence post holes, should continue to be clearly identified to avoid future confusion with earlier archaeological features. The use of a marker layer, such as fine gravel, should be used to distinguish features such as farm fences. Fine gravel should be placed in fence post holes, prior to infilling, when fences are removed. Geotextile or fine gravel should also be used as a base marker layer when material is imported to build up track surfaces. The introduction of additional material to the reserve should only occur after assessment and approval by Ngā Poutiriao o Mauao and Heritage New Zealand.

10.2.5 Approved uses

Mauao is a Historic Reserve, open for public visits. The uses approved for historic reserves, under the provisions of the Reserves Act 1977 (which the Mauao Vesting Act 2008 sits under), include passive recreation and educational visits. Any potential change to approved uses should be reviewed in the light of changed impacts and financial viability, and may require changes to this plan.

10.2.6 Documentation of work

All management work undertaken on Mauao, except for minor general maintenance, should be documented with notes and photographs, and records should continue to be retained on Tauranga City Council files (or other appropriate archival facility). A document bank should hold information relating to the conservation and management of the reserve.

10.3 Specifications for archaeological sites

Any management of the cultural and archaeological landscape within the reserve will require prior consent from the Heritage New Zealand under the provisions of the Heritage New Zealand Pouhere Taonga Act (2014). The outline of this work has been discussed with the Bay of Plenty regional archaeologist for Heritage New Zealand during the preparation of the 2004 Conservation Plan (Wildland Consultants 2004) and updated for this report.

1. Continue to revise the fencing when and where appropriate ensuring that the archaeological features are not compromised by livestock grazing.
2. Continue to establish appropriate indigenous vegetation in selected areas to stabilise archaeological features where grazing is not an appropriate site management practice.
3. Continue to upgrade tracks on Mauao. Track maintenance should align strongly with the CPTED principles defined for Mauao Historic Reserve (Boffa Miskell 2015). Tangata whenua have indicated a marae atea and other enhancements would be appropriate at Te Taumata o Mauao to reflect its significant wāhi tapu status (Boffa Miskell 2014). The redesigning of the trig, to one that reflects the cultural significance of the site should also be considered.

In addition, the following work is required which will not need prior Heritage New Zealand consent unless ground disturbance is necessary.

4. Continue to remove trees planted on archaeological features within the grazed parts of the reserve.
5. Continue to remove trees on the southern slopes of Mauao which are causing damage to intact archaeological features. This should be carried out following the advice of an archaeologist.



6. Continue to trim and/or remove tree saplings, from the area of the stone-faced landing platform associated with the iron jetty on the southern margin of Mauao. This should be carried out following archaeological advice.
7. Implementation of a robust strategy to control rabbits, as they continue to cause significant damage to archaeological features. Regular effective, ongoing rabbit control is essential to ensure that disturbance to archaeological material caused by burrowing activity is minimised.

Regular maintenance and revision of water run-off systems, tracks, and fencing will minimise the risk of accidental damage to archaeological features. The primary function of regular maintenance is to ensure early identification and remedying of problems. Any ground disturbance as a result of regular maintenance will require an authority from Heritage New Zealand.

10.3.1 Vegetation management to protect archaeological features

1. Trees planted on archaeological features and the large trees well established on archaeological features should continue to be removed to prevent further loss of archaeological information. Large trees will need to be removed in a staged fashion.
2. The ongoing selected removal of indigenous trees on archaeological features within the area of regenerating vegetation on the southern slopes of Mauao is also required, to prevent the loss of currently intact archaeological material. Tree species that are vulnerable to windthrow, or have a growth habit that is particularly disruptive to the ground surface (e.g. rewarewa and māhoe (*Melicytus ramiflorus*)) need to be removed as they become established on archaeological features. The position of particular trees and the potential for root development and expansion are the key points of concern for site stability. Archaeological features in this part of the reserve should be regularly inspected by an archaeologist with vegetation and site management expertise, so that undesirable saplings can be identified and removed.
3. Periodic trimming and/or removal of saplings will continue to be required adjacent to the stone-faced landing platform associated with the iron jetty on the southern margin of Mauao, in order to conserve this historic feature. This work should be undertaken with advice from a suitably experienced archaeologist and could be completed in conjunction with archaeological inspections of indigenous vegetation on the southern slopes of Mauao.
4. It is appropriate to establish vegetation other than grazed pasture on archaeological features in parts of the reserve where continued livestock grazing is not desirable for archaeological site protection or other reserve management purposes. In these areas, continued grazing is having a detrimental effect on slope stability and is contributing to the loss of archaeological sites. While establishment of a vegetation cover other than grazed pasture may lead to some loss of archaeological information, on the whole that loss will be less than that caused by ongoing erosion.

The areas to be retired from grazing include the escarpment (that is subject to erosion) adjacent to the base track on the eastern, western, and southern sides of Mauao and the seaward side of the base track. Any retirement of grazing on the southern side of Mauao will require consultation with Heritage New Zealand. Pōhuehue (*Muehlenbeckia complexa*) or meadow rice grass (*Microlaena stipoides*) are suitable plant species to establish on these sites, to stabilise and protect the archaeological features. The planting of scattered pōhutukawa where visible archaeological features are absent would assist to establish a vegetation cover that will reduce weed invasion over time. Ongoing periodic weed control will be required in the interim for areas retired from livestock grazing.

10.3.2 Visitor management

Members of the community that regularly use the tracks on the maunga have a sense of ownership to the site. Overall any effects on the archaeological surface features from visitor use during the past 10 years appear to be negligible which can be attributed to the methods implemented during the ongoing maintenance and enhancement of the existing track network (Phillips 2014). Local users feel a connection with the area and treat the area as part of their 'backyard'. In the past, the Park Ranger has often been informed of maintenance, vandalism and occasionally untoward behaviour by members of the public. Whilst there is no longer a resident Park Ranger, a "Parks Asset Coordinator - Mauao" position based at Tauranga City Council has been developed to look after the reserve. The Parks Asset Coordinator could further nurture the relationship the public has with the reserve by developing the following:

1. Visitor numbers have been monitored and are estimated at one million per year. An informal survey showed that mothers with prams, and over 60s, are the most frequent visitors to the area. A more formal user survey to determine why people visit the reserve - is it for the outdoor experience, physical exercise, views obtained from the site, archaeological features, or perhaps a combination of these experiences - would help to guide future reserve management and interpretation.
2. Tracks should be clearly defined, well maintained, and signposted following the CPTED assessment guidelines specifically detailed for Mauao (Boffa Miskell 2015). This will ensure that informal tracking does not increase and the public feel safe and comfortable while using track network. Track hardening, the use of artificial surfaces and the selected use of board walks are all options worth considering as visitor numbers continue to increase.
3. Although a large amount of work has been undertaken to arrest damage to archaeological and ecological features and channel visitor flow on the summit of Mauao, further attention is required where the public continues to access various dangerous and culturally sensitive 'viewing platforms'. Tracking issues should be resolved using the defined CPTED guidelines while incorporating aspirations of tangata whenua for this significant wāhi tapu (as outlined in Boffa Miskell 2014). Restoration, CPTED and enhancement planting should utilise large-sized (potentially PB8 or larger) plants to minimise access to restricted areas on the summit.



4. Use of the tracks by cyclists should continue to be restricted. Biking - or any other non-authorised vehicle use - on the maunga would be detrimental to archaeological features (e.g. shell middens) and dangerous for other users.
5. Tangata whenua could provide guided walks for large groups. This would enhance visitor experiences, draw attention to the reserves historic and cultural status, and reduce the risk of accidental damage to archaeological features. A programme of guided walks would also provide a valuable learning experience for visiting groups.
6. The Mauao Management Plan stipulates that no long-term commercial activities are allowed on the maunga and short-term one-off commercial activities would be considered by Council (Tauranga City Council 1998). There could possibly be a discussion around granting 'concessions' for those that apply. Concessions would formalise the current informal use of the maunga for commercial purposes (e.g. guided tours for cruise ship clients and running events). Any financial gains received could be put towards funding specific projects on Mauao.

10.3.3 Machinery

1. No earthmoving machinery, or machinery likely to cause ground disturbance during normal operation, should be used in the reserve without prior approval from Heritage New Zealand and Ngā Poutiriao o Mauao. This must also include emergency situations such as firefighting.
2. The 4WD access track is maintained regularly, and the use of machinery for this purpose should continue to be supervised closely. If any ground disturbance is likely to occur in any area that is not already clearly part of the established 4WD track - for example, the establishment of additional culverts - the proposed work should be discussed with Heritage New Zealand to determine if an Authority to Modify is required.

10.3.4 Reserve management activities

1. Archaeological advice should be sought prior to any management activities being undertaken in the reserve likely to cause ground disturbance, to ensure that archaeological features are not at risk.
2. The maintenance of vehicle access to the summit needs to be assessed carefully in relation to impacts on archaeological features. Run-off from the road and the subsequent translocation of archaeological material will always be a potential issue.
3. Water needs to be diverted off tracks at regular intervals. The existing culvert spacing on the 4WD access track is adequate, but will need to be revised if there is any future localised channelling and erosion of archaeological features. Reduction of the velocity ensures that run-off is dissipated over the ground surface, thus preventing channelling. The track should be monitored closely, to ensure that scouring has not occurred after significant weather events.



10.3.5 Grazing

1. The key to minimising damage to archaeological features from grazing livestock is to graze each area lightly for short durations. Modification of fence lines, reducing stock numbers and shorter grazing rotations has proven to alleviate damage issues.
2. Slope stability and archaeological preservation in grazed areas should be closely monitoring and any adjustments to stock management made accordingly. The ongoing implementation of a well-managed rotational grazing programme will continue to result in a reduction of erosion because sheep will not be tracking and camping in particular areas for extended periods of time. Regular breaks from grazing will ensure that the pasture sward has time to establish over exposed archaeological features. In this instance, kikuyu grass is a desirable species as it will establish a robust ground cover that persists during dry conditions. Periodic topdressing with fertiliser will also assist with the maintenance of the pasture sward.
3. Heritage New Zealand has reviewed the fence lines and are happy with the current design. Any localised tracking when found should be addressed under consultation with farm management and an appropriate archaeological supervisor to ensure that all fences continue to be effective for both stock control and archaeological feature management.
4. Any fence posts that are removed should be marked in the ground with a layer of fine gravel placed in the fence post holes prior to them being backfilled. This will ensure that these fence post holes are not confused with earlier archaeological features if future archaeological investigations are undertaken.
5. The short pasture sward has created a habitat favourable for rabbits, with related damage to middens as a result of burrowing. Rabbit numbers in the reserve continue to be high. If rabbit numbers are not reduced damage to archaeological features will continue to accelerate.
6. Ongoing monitoring of the livestock management regime will be required in order to constantly assess its effectiveness.

10.3.6 Information management

1. All relevant documents should continue to be stored in the Tauranga City Council's information database. This will help to combat the loss of information associated with the history and management of Mauao.

10.4 Integrity of setting and landscape management

10.4.1 Overall management theme

Mauao Historic Reserve is a culturally significant wāhi tapu and a dramatic landscape feature on the margin of a large urban population. There is currently no 'sense of arrival', particularly at the western entrance. Much could be done to improve both reserve entrances to reflect the cultural and landscape significance of the area. Intensive

urban activities adjacent to the reserve pose potential risks to the archaeological features, due to the likelihood of inappropriate activities occurring in the reserve. The creation of a buffer or gateway between the reserve and the adjacent urban landscape is desirable. Given the significance of the cultural and archaeological features, a redesigned reserve entrance is justified. A suitably qualified landscape architect should prepare a carefully designed entrance, which draws in the appropriate design elements of the reserve and the relationship of tangata whenua to the land.

It is critical for a landscape as high profile and significant as Mauao, that coherency and consistence is established and maintained in high quality landscape detailing around the tracks and recreation areas. High profile sites, such as the summit and the walking tracks, require standardised facilities, a robust brand, including design details, and materials (a logo or 'brand' could possibly be generated specifically for Mauao). The brand should be developed in conjunction with tangata whenua (Boffa Miskell 2014), so that appropriate signals are sent to visitors about the history and significance of the area. The brand should be both natural and solid to allow for the appropriate image and landscape detailing, necessary for such a significant and popular area. Creating and implementing a 'package' that includes promoting the cultural values, archaeological heritage, ecological restoration and recreational features of Mauao Historic Reserve will continue to encourage visitor use and information sharing. High standards of maintenance of facilities and signs give an impression of care of the reserve and provide a sense of safety for users. Future facility, planting and walking track development should also align with CPTED principles (further discussed below).

Visitor facilities should maximise the quality of the visitor experience while avoiding any adverse impacts on archaeological features. Existing tracks and other recreational facilities, such as seats and signs, are showing very high levels of wear and degradation. Provision and maintenance of appropriate facilities is imperative to the protection of Mauao.

Vegetation can be used to manage key areas of significance on the summit of Mauao. The planting and use of indigenous grasses will provide non-destructive vegetation cover to some of the more prominent archaeological sites. Low profile indigenous grasses (including meadow rice grass) can offer an appropriate cover to some sites, such as the 'amphitheatre' areas adjacent to the main lookout. Plantings of tree and shrub species can be used to control pedestrian traffic.

10.4.2 Tracks

Track surfaces on Mauao are currently maintained using crushed rhyolite. It has good wearing properties and is a suitable natural material for track surfaces.

10.4.3 Look-out edges

Past fires opened up the main lookout area and the edges of many tracks to very steep drops below. Previous vegetation cover was effective in keeping pedestrians back from the edge, but the lack of vegetation now presents a hazard to pedestrians on the summit, and a risk for the reserve managers. The presence of archaeological sites means that heavy fencing, typically associated with steep-edged lookouts, is



inappropriate, given the potential damage which would be caused by the placement of posts.

Natural rocks can be inter-planted, or grouped together, to provide an effective pedestrian barrier, without compromising the views which have been opened up on the summit. Tree planting should punctuate the sweeping views to provide some shelter for visitors to the summit. Large plant sizes should be used at the summit to reduce incremental damage to surrounding vegetation as this is a high use area.

10.4.4 Seating

As with the pedestrian control techniques, seating should be natural, low key, and should not use footings which may result in damage to archaeological sites. The seats should be placed appropriately to allow for resting places in the shade on the summit, and on other tracks on Mauao. A consistent theme, or brand, for seating, fencing, and pedestrian control is crucial to the overall landscape concept for Mauao.

10.4.5 CPTED

A Crime Prevention Through Environmental Design (CPTED) audit of Mauao was undertaken for Tauranga City Council (Boffa Miskell 2015). The assessment used four key principles and seven qualities that characterise well defined safe place from the National Guidelines for CPTED (Ministry for Justice 2005) to underpin the audit. The aim of CPTED is to use environmental design to produce behavioural effects that will reduce the incidence and fear of crime; the following has been reproduced from Boffa Miskell (2015).

Four key principles considered within CPTED are:

1. **Surveillance:** people are present and can see what is going on;
2. **Access management:** methods are used to attract people and vehicles to some places and restrict them from others;
3. **Territorial reinforcement:** clear boundaries encourage community 'ownership' of the space; and
4. **Quality environments:** good quality well maintained spaces that attract people and support surveillance.

Seven qualities that characterise well defined safe places are:

1. **Access:** Safe Movement and Connections. Places with well-defined routes, spaces and entrances that provide for convenient and safe movement without compromising security.
2. **Surveillance and Sightlines:** See and be seen. Places where public spaces are overlooked, and clear sightlines and good lighting provide maximum visibility.
3. **Layout:** Clear and Logical Orientation. Places laid out to maximise safety and help with orientation and way finding.

4. **Activity Mix:** Eyes on the Street. Promoting a compatible mix of uses and increased use of public space.
5. **Sense of Ownership:** Showing a space is cared for. Places that promote a sense of ownership, respect, territorial responsibility and community.
6. **Quality Environments:** Well designed, managed and maintained environment. Spaces designed with management and maintenance in mind to discourage crime and promote community safety in the present and future.
7. **Physical Protection:** Inclusion of well-designed security features and elements such as security cameras and physical barriers.

A number of site specific findings and recommendations are included in the assessment but general guidelines include (derived from Boffa Miskell 2015):

- Crown-lifting of trees and trimming of shrubs on the edge of tracks where it hinders sightlines.
- Relocate and update information signs to clearly indicate track routes and distance from entry and exit points.
- Increase vegetation along track margins with low growing plant species to prevent users from straying from the track and accessing dangerous vantage points.
- Keep tracks and facilities well maintained to convey a sense of ownership and deter vandalism.
- Installation of seating to provide rest and passive surveillance of the track.
- Upgrading some informal tracking to formalise escape routes.

Plant species that can be used in CPTED managed areas (for under-planting or as an informal/soft edge treatment to tracks and edges with steep sides) are listed in Table 3 below.

10.4.6 Other facilities

Establish screen planting (of pōhutukawa) adjacent to the stock yards¹.

10.5 Environmental weeds

10.5.1 Environmental weed distribution, abundance, and priorities for control

Thirty-five of the environmental weed species listed in Table 1 have been mapped (see Figure 4) to show their distribution and abundance on Mauao. A summary of their priority for control is also presented in Table 1 and further discussed below.

¹ The stock yards are outside the cadastral boundary of Mauao Historic Reserve but screen planting here would align with the overall restoration and enhancement of the naturalness of Mauao.

Pampas (*Cortaderia selloana*), Spanish heath (*Erica lusitanica*), Japanese honeysuckle (*Lonicera japonica*), climbing asparagus (*Asparagus scandens*), and Mexican daisy (*Erigeron karvinskianus*) are widespread throughout indigenous vegetation and habitats. Pampas is common in open habitats (bluffs and landslides), but is also found at lower density within scrub and shrubland habitats. Pampas is a high priority for control due to its ability to spread thousands of viable seeds over great distances, its wide environmental tolerances, its potential fire risk, and tendency to form large, dense patches that exclude indigenous species. Spanish heath is also widespread and forms part of the dominant vegetation on the northern mid and upper slopes of Mauao; it is found in the same kind of habitats as pampas and is common on track margins. It is a lower priority for control than pampas as it is readily overtopped and shaded out by woody indigenous species as vegetation succession progresses.

Japanese honeysuckle is locally common in most vegetation/habitats throughout the Reserve. Scattered individuals are present within rank grassland habitat beside the base track on the southern and eastern sides of Mauao, and on the margins of tracks throughout the Reserve. Larger patches of Japanese honeysuckle are locally common at the transition between scrub/shrubland habitats and forested areas, particularly on the southern and western mid-slopes. Japanese honeysuckle is a high priority for control because it is shade tolerant and has the capacity to smother canopy species, preventing the growth and regeneration of indigenous species.

Climbing asparagus is locally common on track margins throughout the Reserve. It is a high priority for control because it is shade tolerant and has the capacity to smother canopy species, preventing the growth and regeneration of indigenous species.

Mexican daisy is locally common on track margins on the southern side of Mauao. It is a high priority for control because of its ability to form dense mats of ground cover which smothers and kills indigenous vegetation, creating habitat for other invasive weed species such as climbing vines. Mexican daisy is also a prolific seeder, with seeds that are able to spread long distances through wind dispersal.

Blackberry (*Rubus fruticosus*) is locally common within short stature vegetation on the southern mid-slopes of Mauao, and at lower density within short stature vegetation in other parts of the park. Blackberry is a moderate priority for control because it can grow to form dense patches that exclude indigenous species.

Gorse is present at low densities within short stature vegetation and on track margins on the northern, western, and southern midslopes. Although gorse is readily overtopped and shaded out by taller-growing indigenous species as vegetation succession progresses, it is a moderate priority for control because it also produces many, long-lived seeds which enable it to persist in an area over many decades. Scattered gorse shrubs are also present within grazed pasture on Mauao, but plants in these habitats are controlled regularly.

Chinese privet (*Ligustrum sinense*), hawthorn (*Crataegus monogyna*), woolly nightshade (*Solanum mauritianum*), and cotoneaster (*Cotoneaster glaucophyllus*) are generally present at low densities throughout the Reserve, although isolated patches with higher densities of these species are also present. Chinese privet and hawthorn



are scattered to locally common within scrub and forest habitats on the south-western mid to upper slopes. In particular, there is a small area of dense Chinese privet and several hawthorn trees near the mid-slope fence line on the southern side of the Reserve. Chinese privet is a high priority for control because it is a shade-tolerant shrub that is capable of forming dense, monospecific stands that exclude all other vegetation. Hawthorn is a high priority for control because it has wide environmental tolerances and can form dense thickets, blocking access, crowding out other plant species, and preventing desirable seedlings from establishing. Individual plants of woolly nightshade and cotoneaster are scattered throughout forest and scrub habitats on the south-western and western sides of Mauao. Cotoneaster is often present within short stature vegetation on track margins. Cotoneaster is a high priority for control because it is long-lived, has wide environmental tolerances, and can form dense thickets which crowd out other plant species, and prevents desirable seedlings from establishing. Woolly nightshade is a high priority for control because it can quickly establish large groups of plants, which can out-compete and crowd out other desirable species.

Boneseed (*Chrysanthemoides monilifera* subsp. *monilifera*), boxthorn (*Lycium ferocissimum*), and swan plant (*Gomphocarpus fruticosus*) are present at low densities in open habitats on the northern and north-western mid-to-upper slopes of Mauao. Occasional individuals of boneseed were observed within open habitats around the midslope track on the northern and north-western side of Mauao. Other plants are likely to be present within this habitat but surveillance and control is undertaken for this species on a regular basis. Boneseed is a high priority for control because it can spread quickly to form dense cover that shades out desirable species; it also produces copious seeds every year, which can remain dormant for up to 10 years. Occasional boxthorn plants were observed during the field survey. Boxthorn is capable of forming dense, long-lived stands which exclude desirable species and has wide environmental tolerances. Boxthorn is a high priority for control on Mauao due to its limited current distribution. Swan plants are locally common alongside the midslope track beneath the bluffs on the northern side of Mauao; a few other plants were also observed in open habitats on the western midslopes. Swan plant is a high priority for control because it has the capacity to form dense thickets that exclude desirable species.

Black wattle (*Acacia mearnsii*) and brush wattle (*Paraserianthes lophantha*) were observed at low densities within open habitats on the mid - to lower slopes on the western side of Mauao in 2014. These species are likely to be present elsewhere and are a high priority for control as they are currently at low densities and have the capacity to spread and establish quickly within low stature vegetation.

Loquat (*Eriobotrya japonica*), tree privet (*Ligustrum lucidum*), Italian evergreen buckthorn (*Rhamnus alaternus*), Japanese spindleberry (*Euonymus japonicus*), smilax (*Asparagus asparagoides*), and Kahili ginger (*Hedychium gardnerianum*) are present at low densities in isolated areas of Mauao. Tree privet, Italian evergreen buckthorn, Japanese spindleberry are a high priority for control because they are capable of rapid spread and forming dense stands that exclude indigenous species. Smilax is a high priority for control because it is shade-tolerant and has the capacity to smother canopy species preventing the growth and regeneration of indigenous species. Bridal Creeper Rust (*Puccinia myrsiphylli*) has been released to combat smilax in Australia. It has



self-introduced to New Zealand and is now locally common in the North Island. The rust affects the stems, shoots, leaves and fruit and is often severe, completely defoliated and killing the plant prematurely (Harman *et al.* 2008). Kahili ginger distribution is concentrated within short-stature vegetation northwest of the summit. It is a high priority for control because it produces massive branching rhizomes, which form a dense layer up to a metre thick, which other plant species cannot penetrate. Above ground, wild ginger shades and smothers indigenous species. It may permanently displace uncommon plant species or specialised plant communities.

A few saplings and seedlings of maritime pine (*Pinus pinaster*), radiata pine (*Pinus radiata*), and other wilding pine species were observed within forest and scrub habitats. These plants should be controlled as a high priority before they mature and produce viable seed, which is capable of spreading widely within the reserve. Two very large radiata pine trees are present beside the base track on the northern side of Mauao. These trees may be difficult to control safely due to their proximity to the track.

Hybrids between pōhutukawa and Kermadec pōhutukawa (*Metrosideros excelsa* × *M. kermadecensis*) have been planted at several sites on Mauao. These plants should be removed, as a high priority, as they are highly likely to hybridise with pōhutukawa and therefore threaten the ecological integrity of pōhutukawa on Mauao.

Chinese windmill palm (*Trachycarpus fortunei*), phoenix palm (*Phoenix canariensis*), tree of heaven (*Ailanthus altissima*), and English oak (*Quercus robur*) are present at low abundances at isolated sites on Mauao. Several mature English oak trees are present near the boundary with the motor camp require removal. Removal of these trees should be undertaken as nearby plantings of indigenous species mature. Elsewhere, English oak should be controlled, as a low priority, where it is present within habitats dominated by indigenous species. Chinese windmill palm and phoenix palm are locally common within mixed exotic-indigenous vegetation near the south-eastern boundary of the reserve. Chinese windmill palm is also present within short-stature vegetation on the south-eastern midslopes of the reserve. Chinese windmill palm is a high priority for control because it is fast growing, has wide environmental tolerances, produces copious seeds, and has the capacity to invade indigenous plant communities. Phoenix palm is a moderate priority for control. It has not been observed within indigenous vegetation and habitats on Mauao, but, if it were to become established, it can replace indigenous trees and inhibit regeneration by producing an impenetrable, long-lived sub-canopy of saplings and seedlings.

Sweet briar (*Rosa rubiginosa*) is present as isolated individuals within short stature vegetation on the south-western mid-slopes of Mauao. It is likely to be present in other areas, but at low density. It is a moderate priority for control.

Two species were only found at single locations: cape daisy (*Arctotheca calendula*) and yucca (*Yucca gloriosa*) were each only observed at one locality during the 2014 field survey. Cape daisy is a high priority for control because it is currently confined to one area. Cape daisy is known to smother other plants growing near it, and therefore may reduce habitat for indigenous species, such as ground orchids and herbaceous species, that grow in open environments. However, Cape daisy may be more extensive on Mauao and if this is the case then it may be too extensive to control

effectively. *Yucca* was found in one locality during the field survey; it does not pose a significant risk to indigenous biodiversity values, but it is not a suitable species in this environment and should be removed.

The provenance of the kauri saplings planted near the summit of Mauao is currently unknown and, due to this, these plants should be removed, as a medium level priority. If any future planting of this species is desired, it should be ensured that the plants are eco-sourced from natural populations in either the Tauranga or Ōtānewainuku Ecological Districts.

Other Environmental Pest Plants

Purple pampas (*Cortaderia jubata*), ivy (*Hedera helix*), willow-leaved hakea (*Hakea salicifolia*), prickly hakea (*Hakea sericea*), black passionfruit (*Passiflora edulis*), tree lucerne (*Chamaecytisus palmensis*), lupin (*Lupinus arboreus*), Himalaya fairy grass (*Miscanthus nepalensis*), mile-a-minute (*Dipogon lignosus*), and white-edged nightshade (*Solanum marginatum*) were not observed within the project area during the field survey in 2014. Purple pampas was mapped with pampas in 1997, so it is not possible to confirm whether this species is still present at the locations where it was observed in 1997. However extensive pampas control has been undertaken on Mauao since 1997 and it is therefore possible that this species is no longer present within the Reserve. The location and extent of ivy mapped in 1997 was outside the boundaries of the project area in 2014 and this species may therefore still be present in the area mapped in 1997. A single plant of prickly hakea was present below the summit in 1997 and 2004; this plant may have been controlled as it was not seen in 2014. A single plant of white-edged nightshade was observed on the edge of indigenous vegetation on the eastern side of Mauao in 1997; this plant was not observed in 2014 and may have been controlled. A single infestation of mile-a-minute was recorded in 1997 near the boundary with the motor camp on the eastern lower slopes; this species was not recorded in this area in 2014 and may have been controlled. German ivy (*Delairea odorata*) and velvet groundsel (*Roldana petasitis*) were observed during field survey in 2014, but these species are located outside the 2014 project area and have therefore not been mapped in this report.

Surveillance for the other environmental pest plant species listed in Table 1, but not mentioned above or mapped in Figure 4, should be undertaken during the course of other weed control work. If found, they should be controlled based to the priorities listed in Table 2.

Comparison With 1997 Inventory

The distribution and abundance of forty-six pest plant species was mapped in 1997 (Wildland Consultants 1997). In 2014, the distribution and abundance of each pest plant species observed during field work was compared with the mapped extent of that species in 1997 and notes were made on differences or similarities between the extent mapped between years. Significant pest plant control has been undertaken on Mauao since pest plant distribution and abundance was last mapped in 1997 (Wildland Consultants 1997) and pest plant control is ongoing. In particular, the extent and abundance of pampas (*Cortaderia* species), wilding pines, blackberry, gorse, boneseed, hawthorn, woolly nightshade, and smilax have reduced significantly



since 1997 (see Table 2 below). Pampas, boneseed, and woolly nightshade are currently the priority for control on Mauao, and regular surveillance and control of these species, along with gorse and thistles, is undertaken (M. Ray, Tauranga City Council, pers. comm. 2014). Other pest plant species are controlled on an ad hoc basis as weeds are identified by Tauranga City Council staff and contractors, by the public, or by Bay of Plenty Regional Council staff and contractors (M. Ray, Tauranga City Council, pers. comm. 2014).

Table 2: Comparison of mapped environmental pest plant distribution and extent between 1997 and 2014.

Common Name	Comparison Between 1997 and 2014	Notes
Barberry	Increased in extent	Not widespread.
Black passionfruit	Not known	Not mapped in 1997.
Black wattle	Not known	Not mapped in 1997.
Blackberry	Reduced in extent	Significant reduction.
Boneseed	Reduced in extent	Significant reduction.
Boxthorn	Increased in extent	Minor.
Brush wattle	Similar in extent	Mapped with silver wattle.
Cape daisy	Not known	Not mapped in 1997.
Cape ivy	Not known	Not mapped in 1997.
Chinese privet	Increased in extent	Minor.
Chinese windmill palm	Similar in extent	Additional plant(s) found in indigenous vegetation in 2014.
Climbing asparagus	Reduced in extent	Significant reduction.
Common alder	Not known	Not mapped in 1997.
Cotoneaster	Increased in extent	
English oak	Not known	Not mapped in 1997.
German ivy	Reduced in extent	Same location, reduced density.
Gorse	Reduced in extent	Significant reduction.
Hawthorn	Reduced in extent	Significant reduction.
Himalaya fairy grass	Reduced in extent	Not observed in 2014.
Italian evergreen buckthorn	Increased in extent	Minor. Recorded at different locations in 2014.
Ivy	Not known	1997 extent was outside project area.
Japanese honeysuckle	Reduced in extent	Significant reduction.
Japanese spindleberry	Similar in extent	Recorded at different locations in 2014.
Kahili ginger	Similar in extent	
Loquat	Not known	Not mapped in 1997.
Lupin	Not known	Not mapped in 1997.
Maritime pine	Reduced in extent	Significant reduction.
Mexican daisy	Increased in extent	Significant increase.
Mile-a-minute	Not known	Not observed in 2014.
Montpellier broom	Not known	Not mapped in 1997.
Oleander	Not known	Not mapped in 1997.
Pampas	Reduced in extent	Significant reduction.
Phoenix palm	Similar in extent	
Pōhutukawa × Kermadec pōhutukawa	Not known	Not mapped in 1997.
Prickly hakea	Not known	Not observed in 2014.
Purple pampas	Reduced in extent	Not observed in 2014. Presume significant reduction.



Common Name	Comparison Between 1997 and 2014	Notes
Radiata pine	Reduced in extent	Significant reduction.
Silver wattle	Reduced in extent	Not observed in 2014.
Smilax	Reduced in extent	Significant reduction.
Spanish heath	Not known	Not mapped in 1997.
Strawberry dogwood	Not known	Not mapped in 1997.
Swan plant	Not known	Not mapped in 1997.
Sweet briar	Not known	Not mapped in 1997.
Tall fescue	Not known	Not mapped in 1997.
Tradescantia	Similar in extent	
Tree lucerne	Not known	Not mapped in 1997.
Tree of heaven	Reduced in extent	Significant reduction.
Tree privet	Increased in extent	Minor. Recorded at different locations in 2014.
Velvet groundsel	Similar in extent	Outside project boundary.
White-edged nightshade	Reduced in extent	Not observed in 2014.
Wilding pine	Reduced in extent	Significant reduction.
Willow-leaved hakea	Not known	Not mapped in 1997.
Woolly nightshade	Reduced in extent	Significant reduction.
Yucca	Not known	Not mapped in 1997.

10.6 Pest mammal control

Overall, pest mammal control programmes currently in place on Mauao are making some reductions in the populations of pest mammal species present. However, some areas have been identified where alterations to control regimes may improve protection of indigenous biodiversity as discussed below (reproduced from Wildland Consultants 2015). Implementation of the regimes described below will provide added benefits for lizards, invertebrates, small birds, and possibly small seabirds if control of large predators and possums is also effective. Control of hedgehogs and mice to low levels would provide additional benefits for invertebrate fauna.

Control of browsing pests should be undertaken prior to planting, each season, in order to ensure low numbers of rabbits, possums, and hares. Rabbits could be controlled to low numbers by using a combination of poisoning, trapping, and dogging.

Pest animal control should be undertaken in conjunction with Bay of Plenty Regional Council pest control officers.

10.6.1 Rabbit

Rabbit numbers continue to be very high. Currently a regime of poison pulses and night-shooting (between mid-February and mid-December) reduces population levels but this strategy requires revision. Reinvansion of rabbits from the beach, Pilot Bay and the local Mount Maunganui residential area is ongoing and a strategy to control rabbit populations may need to include a wider area than just the maunga. Construction of a rabbit-proof fence across the neck of the peninsula could also be considered as a means to mitigate the influence of rabbits on indigenous ecological and archaeological values (further discussed below).

10.6.2 Rodent

Diphacinone baits in bait stations currently used are an effective method of reducing rodent numbers. However, more bait stations are needed to maximise control efficacy. A 50 m grid of stations through the forest, scrub, and shrubland areas and around any non-forest/scrub/shrubland areas of ecological interest, such as the petrel colony and any areas where indigenous lizards may be found will provide more effective rodent control than a less regular bait station distribution. Three pulses of bait a year should be a minimum and it would be highly beneficial to monitor rodent numbers using tracking tunnels before and after each poison pulse, to quantify the success of control operations. It may be advisable to fill bait stations three or four times during a pulse to allow mice access to bait after rat numbers have been reduced. Extra bait station fills should be undertaken around two weeks following the first fill. Rat populations should be indexed at least twice a year, including immediately prior to the first period of control each year in June-July.

10.6.3 Mustelid

Mustelids are elusive and it is unusual for a member of the public to see any animals, however they are highly likely to be present in moderate numbers on the maunga. Currently the trapping regime includes the use of a small number of permanently placed, with some temporary, DOC200 traps. Mustelids are very wary of new objects and changes in their environment, and traps that have never caught stoats, or have not caught stoats in a long time, can suddenly begin to catch stoats. Therefore, the regular moving of existing traps is not ideal. It is suggested that the mustelid trapping regime is revised and the number of DOC200 traps on Mauao is increased allowing traps to be left in place permanently. Use of more than one bait or lure is beneficial as individual mammals may have different bait or lure preferences. Any baiting regime however should be consistent between the DOC200 traps.

10.6.4 Possum

Possum control should be pulsed throughout the year aimed at suppressing possum numbers to below 5% residual trap catch (or bait take) at all times. Management should be adaptive, utilizing the most cost-effective and environmentally acceptable methods available. Depending on baseline possum levels, numbers could be depressed initially by poisoning. Alternatively, trapping pulses could be implemented.

10.6.5 Domestic animal control

Control of feral cats in areas where domestic cats may be present is difficult and has the potential to be a public relations 'problem'. Cat owners living close to Mauao should be contacted to discuss the risks cats pose to indigenous fauna, and methods of responsible cat ownership. If cats are sighted on Mauao, live traps should be used to catch the cats and, if they are not claimed, they should be destroyed.

Dogs are not permitted on Mauao, but are still occasionally a problem, especially for penguins and other ground-nesting birds. Rangers and volunteers working on Mauao should be vigilant and ready to take steps to remove any dogs.

10.6.6 Buffer zone

With water on three sides and residential property on the other, the geography of Mauao means that reinvasion by some pest species are likely to be slower than in other mainland sites. Several pulses of intensive pest mammal control on Mauao coupled with a permanently-maintained grid of bait stations and traps along the narrow neck of landing between Mauao and the "mainland", including controlling rabbits on the dunes, may lead to local eradications of some pest mammal species and a substantial, sustained reduction in numbers of others. Rat and stoat control should be considered for areas of Matakana Island adjacent to Mauao, to limit re-invasion of Mauao by animals swimming across the Tauranga Entrance.

10.6.7 Predator-proof fence

Installation of a fence to exclude the reinvasion of rabbits and other pest animals into Mauao Historic Reserve should be considered. Fence installation would work in conjunction with pest animal control strategies on the maunga. Removal of pest animals will not only protect the archaeological features but will also improve indigenous fauna habitat, vegetation condition, increase success rates of planting, and protect the cultural values of the area. Subject to position and height, a fence could be potentially intrusive, restrict people movement, be structural-looking, and could impact on the natural character of the area, but the benefits to the cultural, archaeological, and ecological values of the site within the fence boundaries would be considerable.

Any potential fence alignments would need to be determined in consultation with Heritage New Zealand, but relatively little ground disturbance would be required for installation at the base of the maunga, and could follow existing fence lines across the 'neck' of the peninsula. Although Mauao accommodates high visitor numbers 24 hours a day the installation of a pest-proof fence would not restrict exit and entry into the area as entry/exit gates could be positioned roughly at their current locations. Vehicle access could also be accommodated.

There are three obvious options for pest-exclusion fences at Mauao:

- A rabbit-proof fence 1.3 m tall.
- A fence to exclude rabbits, possums, hedgehogs, rodents, and mustelids, also 1.3 m tall.
- A fence to exclude all of the above plus cats (and dogs), which would be 2 m tall.

The costs of these three options vary considerably, with a rabbit fence being the lowest cost and lowest impact option, and may be able to be largely based on modification of existing fences. A fence to exclude the full suite of pest species (i.e. two meters tall) would require a clear zone of about four meters, and a benched fence line track would also be required. However, a pest-proof fence that does not exclude cats (1.3 m tall) may only need 2-3 metres of clearance outside of the fence. Any cats inside the fence could be relatively easily controlled using other methods. Both of the latter options would restrict the reinvasion of rodents, mustelids, rabbits, possums and hedgehogs. Once pests have been removed or



reduced to very low numbers, potential reinvasion sites will require active management, e.g. at the sea ends of the fence and from Matakana Island. This type of pest animal management is currently being undertaken successfully at other sites such as Shakespear Regional Park, north of Auckland.

10.7 Interpretation

Currently there is a lack of interpretation information expressing the special relationship between tangata whenua and Mauao (Boffa Miskell 2014). Interpretation panel information that is available is out of date. Site specific panels would improve visitor appreciation and understanding of the area. They should highlight the outstanding cultural heritage features and significant ecological values of the reserve, as well as drawing attention to any cultural restrictions (e.g. eating while on pa sites) and safety issues. Tangata whenua have recognised the need for explanatory panels for the reserve gateway and interpretation panels or pouwhenua to identify special places and landmarks (Boffa Miskell 2014).

The cultural values assessment (Boffa Miskell 2014) provides guidance and suggestions for various sites on the maunga. Allocation of funding and implementation of these should be a high priority.

An updated self-guiding pamphlet on the historic, cultural and ecological values of the area would also be useful for visitors.

10.8 Publicity

Appropriate publicity opportunities, in local and national media, should continue to be utilised to heighten public awareness and appreciation of the significance of the Mauao cultural values, archaeological heritage ecological restoration and recreation values. The creation of online tools and consistently updating various social media platforms would:

- Keep locals and visitors informed of news and events of the Reserve.
- Educate users on the values of the site.
- Let visitors know what the Reserve has to offer.
- Promote visitor activities.
- Track interest in the reserve and potentially find out why people visit.
- Visually advertise and promote the beauty of the area.

Although high visitor numbers present could pose a potential threat to archaeological features in the reserve, appropriate management of those visitors minimise that threat. High visitor use of the reserve presents an opportunity to increase awareness of historic heritage values. Media coverage should be sought for all conservation works (cultural, archaeological and ecological) carried out in the reserve.

10.9 Fire

The reserve is in the Western Bay Moana Rural Fire District and there is a requirement to have an approved fire plan by 1 October each year.

The primary fire management objective for rural fire authorities is to minimise risk of fire while retaining sufficient resources to rapidly extinguish any outbreak of fire that does occur. Fire management on Mauao needs to focus on fire prevention, pre-planning for fire control, and public safety. The risk of fire can be reduced considerably through the implementation of a well-publicised active fire prevention programme. This programme should include:

1. Establishment of a year round total fire ban (including cigarettes).
2. Regular assessment of fire risk using established Rural Fire Authority standard FDR ratings.
3. Establishment of a standard rural fire rating sign that show the current level of fire risk: extreme, high, moderate, or low.
4. Radio and newspaper advertising of fire risk, to educate reserve users about fire prevention measures, fire risk, and public safety issues. Publicity should increase as the risk increases.
5. Visits to local schools, community groups (e.g. Lions, Rotary) and user groups (e.g. running clubs) to publicise the risk.
6. Analysis of the causes of previous fires (e.g. arson, camp fires) can help determine where prevention activities should be focused.
7. Maintain a high level of fire suppression readiness.
8. Reduce levels of management activities and public access as the fire risk rises. A total ban on public access should be considered during periods of extreme fire risk (this has been used in similar situations but should only be a last resort, in very extreme situations).
9. Remove highly flammable vegetation - in particular dead pampas - from the sides of all tracks (i.e. where visible and easily accessible to track users).

Pre-planning for fire suppression can significantly reduce the potential spread of fire. It focuses on early detection, initial fire attack procedures, pre-arranged fire control strategies, call out procedures, and training of firefighting personnel. Pre-planning should include the following elements:

1. Establishment of a network of observers and publicised fire reporting procedures. Observers can include residents with clear views of Mauao, boaties, aero clubs, and regular users.
2. Close liaison with other fire management agencies, e.g. New Zealand Fire Service and the Department of Conservation. Joint training exercises should be undertaken on Mauao, to ensure that initial attack, in the event of a real fire, is both rapid and effective.
3. Regular (at least annual) training of Tauranga City Council staff that are involved with the management of Mauao and volunteers in fire control strategies, undertaken to industry standards.



4. Fire control strategies and fire plan should be reviewed annually. Public safety should be addressed specifically in the fire plan and action plan for Mauao. Priority must be given to the evacuation of reserve users immediately following the outbreak of fire.
5. Water supplies for firefighting should be reviewed. Supplies should be strategically placed to allow aerial access, ready vehicle access, and safety of firefighting personnel.

The greatest fire risk is associated with areas of early successional scrub on the northern slopes. Planting on Mauao should avoid the use of flammable species such as mānuka. This is very suitable for revegetation but other species are less likely to carry fire; e.g. karamu and ngaio. Reducing the fuel loadings of vegetation can significantly reduce the intensity of a fire, thus making it easier to control and reducing the risk of it spreading. Reduction of fuel loadings at Mauao can be achieved by using appropriate species during planting programmes in combination with maintaining a short pasture sward where grazing is to be continued.

10.10 Revegetation guidelines

Mauao Historic Reserve has been divided into nine broad Management Units which are shown in Figure 5. These are generally based on weed control and revegetation priorities.

Key factors in the successful establishment of indigenous vegetation on Mauao are:

- Species selection.
- Site preparation.
- Planting techniques.
- Maintenance of plantings.
- Ongoing weed control.

10.10.1 Species selection

Plant species have been selected that would occur naturally on the types of sites present on Mauao. The overall aim of the revegetation/restoration work is a fundamental factor when selecting plant species. Pōhutukawa is a key element on Mauao (and along the Bay of Plenty coast in general) and should continue to be a key species on Mauao. Another particularly important consideration is the relative flammability of species (some species planted prior to 2003 are considered to be highly flammable and this has been an important consideration when selecting species since the 2003 fire). A list of species and their relative flammability is provided in Appendix 6. Other issues considered include the overall appearance of the mountain and requirements for low maintenance.

A preliminary plant schedule is presented below in Section 10.10.2, but suites of species should be selected to suit individual sites. A full list of plant species potentially suitable for inclusion in plantings on Mauao is presented in Appendix 6. All plants should be sourced from Tauranga or local Bay of Plenty genetic stock, and should generally be grown from seed.



Most species will need to be grown in PB2 or PB3 planter bags. However, root trainer stock would be suitable for some species (e.g. tī kōuka (*Cordyline australis*), wharariki (*Phormium cookianum*), koromiko (*Hebe stricta*), and karamu (*Coprosma robusta*)), however where cover is required to quickly establish (e.g. track margins) it would be appropriate to use PB stock for these species as well, up to PB8 where size of the plants would provide an immediate cover or barrier. Plant stock should be ordered one to three years prior to planting to allow suppliers adequate time to source seed and grow stock. Early orders can sometimes also attract lower prices.¹

10.10.2 Species schedules

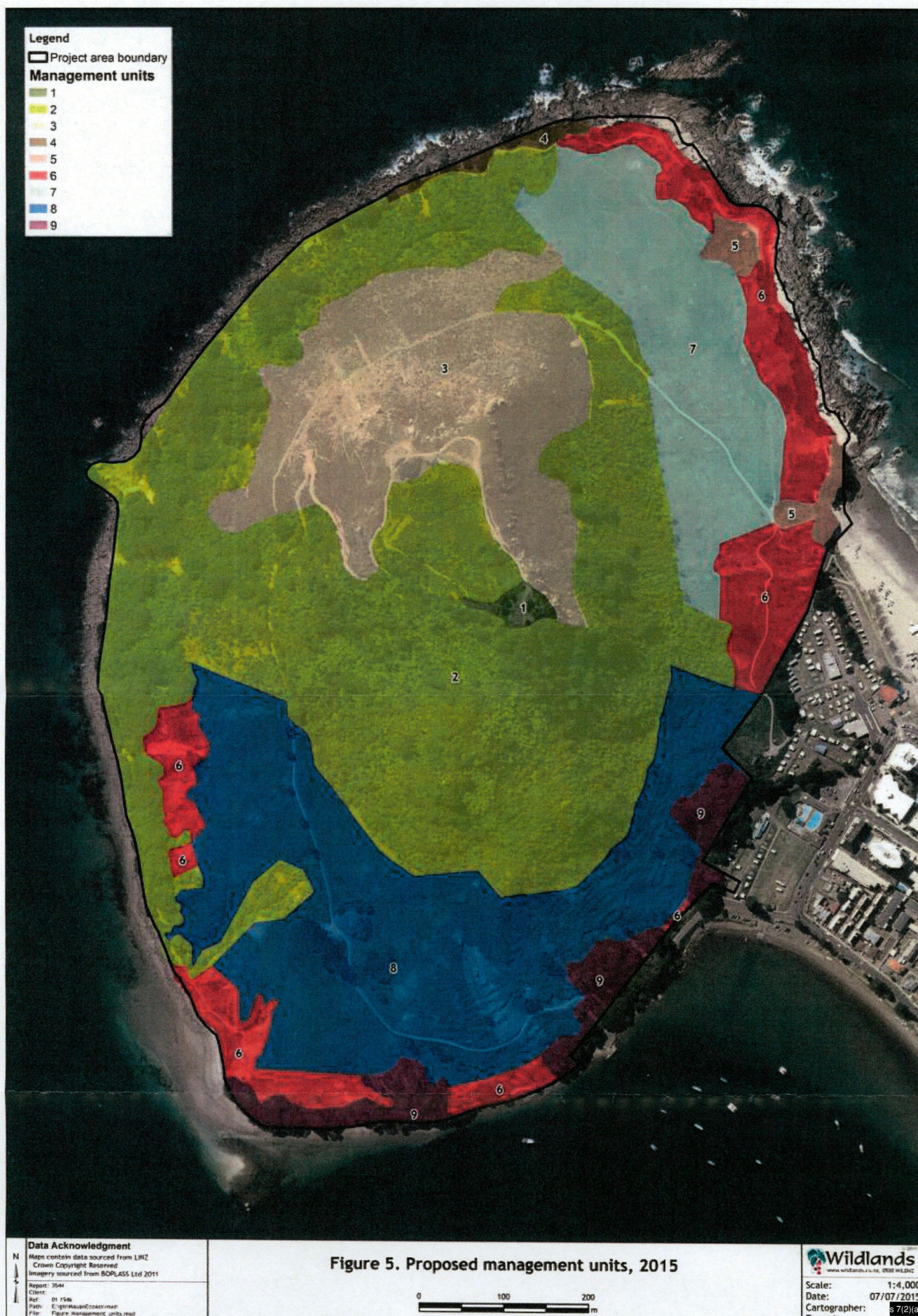
Various complements of indigenous species are suggested for planting in each of the management units, as set out below in Table 3. In addition plant species that are recommended for areas (including track margins) under CPTED management are listed. An expanded list of species suitable for planting on Mauao is presented in Appendix 6.

Table 3: Plant species recommendations for each Management Unit and CPTED managed areas.

Species	Management Unit									CPTED Sites ³
	1	2	3	4	5	6	7	8	9	
<i>Asplenium oblongifolium</i>	2									1
<i>Astelia banksii</i>	1									2
<i>Carmichaelia williamsii</i>			1							
Coastal māhoe (<i>Melicactus novae-zelandiae</i>)		1	2		1		1		2	
Houpara (<i>Pseudopanax lessonii</i>)		1	1		1	1	2		1	
Karamu (<i>Coprosma robusta</i>)		1	1				2		1	
karaka (<i>Corynocarpus laevigatus</i>)			1							
Karo (<i>Pittosporum crassifolium</i>)		1	1			1	1		1	
Kiokio (<i>Blechnum novae-zelandiae</i>)	1									1
Koromiko (<i>Hebe stricta</i> var. <i>stricta</i>)	1		1			1	1			1
Meadow rice grass (<i>Microlaena stipoides</i>)	1		1							1
Ngaio (<i>Myoporum laetum</i>)		1	1		1	1	1		1	
<i>Olearia pachyphylla</i>			2							
Pōhuehue (<i>Muehlenbeckia complexa</i>)				1		2				
Pōhutukawa (<i>Metrosideros excelsa</i>)	1	2	1	1	1	1	1	1	1	
Pūriri (<i>Vitex lucens</i>)		1					1		1	
Tauhinu (<i>Pomaderris amoena</i>)	1									1
Taupata (<i>Coprosma repens</i>)	1	1	1		1	1	2		1	
Wharariki (<i>Phormium cookianum</i>)	1	1	1			1	2		1	1
Whau (<i>Entelea arborescens</i>)		1					1		1	

- Key**
1. These species should comprise the bulk of the plantings.
 2. To be used in low numbers.
 3. To be used as under planting or alongside tracks where low-growth plant species are required (in CPTED managed situations).

¹ Most root trainer stock will be easily obtained the October prior to planting, but some species may require a longer lead-in time, e.g. up to two years.



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The restoration area includes opportunities for cultural plantings and options for cultural plantings should be considered when planning the restoration of individual areas.

10.10.3 Site preparation for planting

Pasture/Exotic Grasses and Herbs

Planting sites that are pasture, or where exotic grasses and herbs have established following tree felling, clearance of debris, or spraying of weeds will require spot-spraying or blanket spraying with herbicide prior to planting.

During planting, individual planting sites with a dense grass/herb cover should be screefed (i.e. remove plant material and roots from an area about 0.35 m in diameter), plants should then be planted in the centre of these cleared micro-sites.

Areas with Exotic Trees¹

Priorities for site preparation in these areas are listed below:

- Fell large exotic trees and mulch or remove debris.
- Cut all other small exotic trees and shrubs (remove debris), and swab stumps with herbicide.
- Knapsack spray or cut, and stump swab other weeds as appropriate (e.g. tradescantia). This will need to be undertaken more than once, in the summer months, with approximately 8-12 weeks between herbicide applications.
- Blanket spray 2-3 weeks prior to planting.

10.10.4 Plant spacings

Plant spacings when using PB stock should be c.1.5 m, and c.1.2 m for root trainer stock. This will ensure that canopy closure is achieved relatively quickly and reduce opportunities for weed establishment. Pōhutukawa should be planted at 8-10 m spacings.

10.10.5 Timing

Planting should be undertaken in the winter, preferably in early winter (e.g. May) to allow plants to become well established before summer.

10.10.6 Maintenance

Plantings will need to be released from all weed competition two or three times during the first year following planting, and 1-2 times in the following two or three years until plants have become established. Only aggressive woody weeds (e.g. gorse,

¹ For example within Management Unit 9.

blackberry, and pampas) will need further control until canopy closure is achieved. Some parts of the planting sites may be able to be left unreleased after 18 months if plants are well established.

Plants that die in the first year should be replaced (by infill planting), particularly where their absence would allow growth of aggressive weeds.

This management approach should be maintained for successive new plantings over the next 5-6 years, and then assessed to determine if it is appropriate and modified to correct any inadequacies.

10.11 Management of threatened and local plant species

The flora of Mauao reflects the diverse character of the habitats present. The distribution and relative abundance of various species will change as vegetation succession proceeds. It is also likely that more indigenous species will continue to establish naturally (weed species as well).

If track construction or other development is considered in, or near, habitats where *Psilotum nudum*, *Lepidosperma laterale*, mangemange, and *Tetraria capillaris* occur, these species should first be located and protected. All sites potentially affected should be inspected prior to any future track construction or re-alignment, to determine if any populations of threatened or local species are present.

One of the *Psilotum nudum* populations occurs in an area used for recreational climbing. The population on the climbing site should be monitored. If *Psilotum nudum* becomes threatened by increased climbing activity it may become necessary to survey other parts of Mauao to ensure that the species is secure. The cliffs have also been affected by fire and are somewhat unstable. This may also pose a risk for *Psilotum* and other cliff species.

Several nationally threatened or local species that occur naturally in coastal areas in the Bay of Plenty Region may have been present previously on Mauao and consideration could be given to the establishment of locally-sourced populations. Potentially suitable species and the appropriate habitats for establishment are listed below. Small scale planting trials should be considered, as the causal factors of decline may still be operating and hence re-establishment may not be successful. Any plantings should be monitored.

Beaches

Poa billardierei (hinarepe, sand tussock)
Ficinia spiralis (pingao)
Euphorbia glauca (Waiu-o-Kahakura)
Lepidium oleraceum (Nau, Cook's scurvey grass)
Pimelea villosa (sand daphne)
Tetragonia tetragonioides (New Zealand spinach)

Shrubland and Secondary Forest

Pimelea tomentosa
Olearia pachyphylla
Carmichaelia williamsii

Forest

Marrattia salicina (para; king fern)
Nestegis apetala (coastal maire)
Pisonia brunoniana (parapara)

11. MONITORING

11.1 Archaeological features

A condition monitoring programme should continue for the archaeological features within the reserve. Comprehensive monitoring is required in order to:

- Monitor the effectiveness of the grazing regime - to regularly review the grazing regime to maintain the pasture sward without causing damage to archaeological features. Monitoring should include fence lines, gates, and water troughs, and should be carried out at pre-determined intervals. For example, it would be useful to monitor the site following heavy rainfall or during prolonged dry spells, when ground damage from livestock is most likely to occur.
- Monitor whether visitors or other reserve management activities are having detrimental impacts - simple regular walk-through surveys can be used to monitor impacts of visitors and other management activities. The checklist of effects to be monitored should include graffiti/vandalism, damage to archaeological features by vehicles used in site management, damage caused by track and/or road maintenance and water run-off, damage caused by informal tracking, deterioration or damage to structures, and safety issues related to structures or reserve features. The checklist should include recording of the remedial actions required and the person responsible for them. In addition to these surveys, informal monitoring should be undertaken during any site visit or after specific management actions.
- Detect short and long term changes in vegetation that may lead to detrimental impacts on archaeological features.

11.2 Vegetation

- A series of photopoints should be established to monitor vegetation change on Mauao. These should include views of all side slopes and of the main vegetation/habitat types. Photographs should be taken at regular intervals, say every 1-3 years.

- It is also recommended that long term monitoring be established to check for new weed infestations and to monitor the rate of spread, or otherwise, of current infestations.
- A series of permanent vegetation monitoring plots should also be established and remeasured every 3-5 years.
- Foliar Browse Index (FBI) should be used to assess possum impacts on vulnerable species, e.g. pōhutukawa.
- It is important that plantings are monitored regularly, to determine survival of different species and relative growth rates, and other trends.

11.3 Fauna

The following monitoring should be implemented for key pest species and selected indigenous species:

- Annual possum monitoring using standard repeatable approaches (e.g. residual trap catch using ethically-certified leg hold traps, or bait take using wax blocks). The small size of Mauao would favour the latter method. Subsequently outcome monitoring of sensitive tree species (e.g. pōhutukawa and māhoe) should be undertaken annually (c.f. Payton *et al.* 1999).
- Rat monitoring should be undertaken at least biannually including in the early part of the seabird breeding season (June/July) and in summer. Either tracking tunnels could be used or wax blocks (c.f. Handford 2000).
- Mustelids and cats are not easily indexed, particularly in small areas. Operational monitoring should comprise a comparison of inter-year trap catch, a database of sightings compared between years, and assessment of breeding success and causes of failure of seabird species (see below). If mustelids and/or cats persist, use predator dogs to gauge the extent of the problem, and potentially to hunt and/or kill pest animals.
- Seabird monitoring - annual monitoring initially (and then every three years) of burrow occupancy and breeding success of kororā and ōi. Compare annual results with past studies (e.g. Jervis and Davies 2000 and H. Clifford pers. comm. 2014). OSNZ monitoring should be maintained. For dead birds, determine likely cause(s) of death by examining the scene for sign, including searching for predator bite marks and scats.
- Fur seal numbers - undertake regular counts of haul-out areas at set times of the year to determine trends in numbers. Monitoring of human behaviour around these sites is also recommended.
- Visiting birds - keep a database of threatened species visiting the reserve, e.g. kārearea and North Island kākā (*Nestor meridionalis*).
- Lizard diversity and abundance - an initial survey is needed to determine diversity of species present, from which a monitoring programme can be derived.

11.4 Human use

A visitor survey should be undertaken to establish the types and patterns of visitor use. A survey could include the following elements: background research, development of a field survey, field survey, and data analysis. A field survey could be undertaken using personnel positioned at key locations in the reserve. Surveys could be repeated at five-yearly intervals.

12. RESEARCH

The need for further research in the following areas became apparent during the preparation of the conservation plan in 2004 (Wildland Consultants 2004):

- Archaeological research to determine whether buried archaeological features are present within the grazed portion of the reserve on the eastern slopes of Mauao.
- Archival and archaeological research to determine the nature and origin of the archaeological features associated with the stone steps.
- Conservation advice¹ and assessment of the stone steps and stone jetty in order to determine what conservation treatment is required and/or appropriate. It is possible that the stone structures have been so heavily modified by 'repairs' carried out in the past that there is little or no original fabric remaining.

13. MANAGEMENT UNITS

Mauao has been subdivided into nine management units (refer to Figure 5) and management guidelines are provided below to underpin future management in each unit. Potential planting sites have been identified, to increase the area of indigenous vegetation. This would provide a larger area of habitat for indigenous plants and animals, and support tangata whenua aspirations for Mauao.

A simple objective and set of key issues has been identified for each management unit. Management Units 1, 7, and 8, about 50 percent of Unit 9, and the southern slopes of Unit 2 are to be managed primarily for the protection of cultural heritage landscape. While the majority of Unit 2, and Units 3, 4, 5, 6, and 9 are to be managed primarily for ecological restoration. Note that the southern slopes of Unit 2 are to be retained in indigenous vegetation and that further archaeological investigation is required in Unit 8.

¹ Advice should be sought from a specialist formally qualified in the conservation of historic stone structures. It is important that an appropriate person is identified because this is a highly specialised area.

Management Unit 1

Protect archaeological values and views while supporting a high level of public visitation to the summit.

- Review and implement ideas from the cultural values assessment with regards to the summit.
- Continue to revegetate track margins with low growing plant species to prevent users from straying from the track and accessing dangerous vantage points.
- Use PB8 size plants where appropriate to quickly establish cover and deter visitors from dangerous vantage points.
- Maintain permanent control of mustelids and cats, and pulsed control of possums and rats.

Management Unit 2

To be retained in indigenous vegetation. Manage indigenous vegetation on the southern slopes where it is protecting archaeological features.

- Maintain indigenous vegetation cover.
- Regular maintenance and manipulation of vegetation will be required to protect archaeological features.
- Selective control of invasive weeds.
- Local planting (mainly pōhutukawa) where required.
- Maintain permanent control of mustelids and cats and pulsed control of possums and rats.
- Remove lemonwood and replace with appropriate indigenous species.

Management Unit 3

The long term aim for this area is to establish pōhutukawa forest; the short term aim is to reduce pest plant cover and establish a vegetation cover that is relatively resistant to fire.

- This area was burnt in 1997 and January 2003. Parts were planted in June 2003.
- Many of the plants that were burnt continue to grow, particularly near the margins of the fire scar. Wharariki has been planted adjacent to tracks, along with lesser amounts of taupata and ngaio. Other species suitable for planting are pōhutukawa, karaka, karamu, houpara, koromiko, coastal māhoe, and karo. Several of these species are suitable for planting in root trainers, which leads to cost savings in plant stock and planting cost - wharariki, karamu, and koromiko. It may be advisable to continue to use PB stock adjacent to tracks where the

establishment of a dense fire resistant cover within as short a time as possible is desirable. A list of species and relative flammability is provided in Appendix 5.

- Control invasive pest plant species such as boneseed and pampas.
- Control radiata pine, brush wattle, boxthorn, gorse and swan plant as a secondary priority.
- Maintain permanent control of mustelids and cats and pulsed control of possums and rats.

Management Unit 4

The long-term goal is to re-establish a continuous canopy cover of pōhutukawa along the coastline.

- This area currently comprises pōhutukawa trees in declining health on the northern side of the base track.
- Plant pōhutukawa at intervals between existing trees along the coast line. Trees may require some sort of shelter (e.g. an informal stone enclosure) to provide suitable establishment sites and protect them from public interference.
- Control exotic grass species, and plant pōhuehue and rice meadow grass in between pōhutukawa trees.
- Maintain permanent control of mustelids and cats, and pulsed control of possums and rats.

Management Unit 5

Continue to establish indigenous forest and connect the corridor of pōhutukawa around the base of Mauao (linking with Management Unit 6).

- This area currently comprises pōhutukawa with indigenous plantings.
- Continue to establish a continuous strip of pōhutukawa-dominant forest. In between planted and existing pōhutukawa add ngaio, houpara, karamu, wharariki, and taupata.
- Release and maintain revegetation plantings.
- Maintain permanent control of mustelids and cats and pulsed control of possums and rats.

Management Unit 6

Retain grazed pasture in the short term, undertake further archaeological investigation and, subject to results from that investigation, either retain as pasture or plant with indigenous trees and shrubs.



Re-establish a corridor of pōhutukawa linking up with existing forested remnants around the base of Mauao (Management Unit 5).

- Parts of this area are currently grazed pasture.
- The coastal margins of this unit include a discontinuous fringe of scattered pōhutukawa over exotic grasses. Continue to establish a continuous strip of pōhutukawa-dominant forest (linking with Management Unit 5). In between planted and existing pōhutukawa add ngaio, houpara, karamu, wharariki, and taupata.
- Consider planting the grassed area in the future, particularly the steeper slopes, to re-establish indigenous vegetation. Prior archaeological research would be required in order to determine if this area contains buried archaeological features. If this area is part of the archaeological landscape it should remain in grazed pasture.
- This area also contains some evidence of shell middens and is likely to contain buried archaeological features. Planting is required to stabilise the eroding escarpment. Planting will require prior consent from Heritage New Zealand.
- The long term aim could be to re-establish tall forest, dominated by pōhutukawa; the short term aim is to re-establish vegetation cover which is relatively fire resistant. Pōhutukawa, taupata, koromiko, ngaio, karamu, wharariki, karo, and houpara should form the bulk of the plantings.
- Ensure invasive pest plant species such as boneseed and pampas are controlled if grazing is removed.
- Remove Kermadec pōhutukawa (*Metrosideros kermadecensis*) and replace with pōhutukawa (*Metrosideros excelsa*) or other appropriate indigenous species.
- Remove rabbits (potentially erect rabbit-proof fences and eradicate rabbits) and maintain permanent control of mustelids and cats and pulsed control of possums and rats.

Management Unit 7

Continue to revegetate the pasture where Heritage New Zealand has confirmed indigenous revegetation is appropriate, but maintain areas in grazed pasture as required to protect archaeological features.

Create canopy closure in areas that have already been planted by infill planting to prevent pest plant species establishment. Long term aim is to develop pōhutukawa forest (subject to the results of further archaeological investigation).

- Control all pest plants within the restoration plantings.
- Undertake or encourage archaeological research to determine if the area contains cultivated soils or buried archaeological features. This research will determine whether it is necessary to maintain this area in grazing.

- Establish scattered plantings of pōhutukawa if this is determined to be appropriate following archaeological investigation.
- The long term aim could be to re-establish tall forest, dominated by pōhutukawa; the short term aim is to re-establish vegetation cover which is relatively fire resistant. Pōhutukawa, taupata, koromiko, ngaio, karamu, wharariki, karo, and houpapa should form the bulk of the plantings.
- Remove rabbits (potentially erect rabbit-proof fences and eradicate rabbits) and maintain permanent control of mustelids and cats and pulsed control of possums and rats.

Management Unit 8

To be maintained in grazed pasture where it is required to protect archaeological features.

- Reduce pest plant species distribution and abundance.
- Selective removal of exotic trees.
- Paint water reservoir.
- Remove poplar trees from the southern side of the water reservoir once the indigenous species planted underneath are established.
- Control rabbits (or erect rabbit-proof fences and eradicate rabbits) and maintain permanent control of mustelids and cats and maintain permanent control of mustelids and cats and pulsed control of possums and rats.

Management Unit 9

Exotic trees occur throughout this unit, interspersed with indigenous trees, and the aim is to re-establish pōhutukawa-dominant forest.

- This unit comprises a mixture of karaka, and pōhutukawa, which should be maintained, and exotic trees.
- The long term aim for this area should be to fell and remove the exotic trees, and control pest plant species growing beneath the trees.
- Plant to re-establish tall forest of pōhutukawa, karaka, and pūriri. Plantings should include pōhutukawa, karaka, houpapa, ngaio, karo, taupata, wharariki, koromiko, karamu, tī kōuka, and coastal māhoe, with lesser amounts of whau. Pūriri can be planted in sheltered areas.
- Planting in this area will require the prior consent of the Heritage New Zealand as it is highly likely to contain buried archaeological features.
- Maintain permanent control of mustelids and cats and pulsed control of possums and rats.



14. WORK PLAN AND TIMING

A work plan with generalised timelines has been identified and is presented below. Note: It will be necessary to obtain quotes from potential suppliers for the tasks listed below.

Table 4: Selected tasks for management and conservation of Mauao, and their relative timing.

Tasks	Timing
ARCHAEOLOGY	
Ongoing informal archaeological inspections:	
• Continue to assess and revise fencing and grazing regimes to determine if there are any new negative impacts.	Weekly/monthly basis.
• Monitor tree saplings that may require trimming/removal from the area of the stone-faced landing platform associated with the iron jetty on the southern margin.	Weekly/monthly basis.
• Address the above.	As required.
Continue formal archaeological inspection and condition assessments by appropriate professional.	As required (for specific events) or at 10 yearly intervals to assess long-term effects.
Obtain archaeological advice prior to any management activities being undertaken in the reserve likely to cause ground disturbance, to ensure that archaeological features are not at risk.	As required.
Consult with archaeologist and Ngā Poutiriao o Mauao about further enhancement of the summit and associated open spaces and track network (e.g. trig replacement, construction of a marae atea, interpretation and other facilities).	Prior to any further work.
Consider further archaeological research in particular in MUs 6, 7, 8 and potentially the southern side of MU2.	
Consult with Heritage New Zealand with regards to the revegetation of MU6 and 7.	
ECOLOGICAL ADVICE	
Obtain advice re specific activities and review specific ecological restoration activities with an experienced restoration ecologist.	As required.
PLANTING	
Ecological advice:	
• Finalise plant schedules (include infill and blanking plants).	Yearly - January/February.
• Confer with appropriate professionals with regard to yearly planting programmes.	Yearly - January/February.
Order plants.	Yearly for following year.
Site preparation (generally only covers spot spray immediately prior to planting; other weed control/site preparation covered under weed control).	April.
Monitor and maintain current restoration plantings.	February/March and November/December.
Planting and plant layout (1.5 m spacings for smaller PBs (PB3 and PB4); 10 m Spacing for pōhutukawa; and 1.2 m spacings for root trainer stock).	May or August/September.
Maintenance of plantings (for three years following planting).	February/March and November/December.
Small-scale plantings of nationally threatened and local plant species - plants and maintenance.	August/September.
Infill planting (site preparation, plants, and planting).	As per above.
Continue to plant pōhutukawa around the base track, particularly in MU4 and 6.	May or August/September.
Plant ngaio, houpara, karamu, wharariki and taupata in between pōhutukawa in MU5 and 6.	May or August/September.
Restoration planting in MU6 (under consultation with Heritage New Zealand).	May or August/September.
Continue revegetation programme in MU7.	May or August/September.

Tasks	Timing
Restoration and enhancement planting in MU9.	May or August/September.
Enhancement planting where appropriate around sites of cultural value (e.g. around puna).	May or August/September, as required.
Use culturally significant plant species in plant species selections.	As required.
Use plants to restrict access to culturally sensitive areas.	As required.
PEST ANIMAL CONTROL	
Review rabbit control programme.	Yearly.
Implement rabbit control.	Year round.
Review mustelid control programme.	Yearly.
Implement mustelid programme.	Year round.
Continue to control cats.	Year round.
Review possum control programme.	Yearly.
Possum control.	Year round.
Review rat control programme.	Yearly.
Implement rat control.	Year round.
Keep data of trap catches (mustelid, cat, rat and possum where appropriate).	Year round.
Continue to exclude all dogs.	Year round.
INDIGENOUS FAUNA	
Prevent human disturbance at seal haul-out areas.	Year round.
Undertake a lizard diversity and abundance survey.	As soon as possible.
FIRE	
Review fire plan.	Yearly.
Maintain a year round total fire ban (including cigarettes).	24/7.
Assessment of fire risk.	Weekly.
Radio and newspaper advertising of fire risk, to educate reserve users about fire prevention measures, fire risk, and public safety issues. Publicity should increase as the risk increases.	Ongoing.
Visits to local schools, community groups (e.g. Lions, Rotary) and user groups (e.g. running clubs) to publicise the risk.	Ongoing.
Maintain a high level of fire suppression readiness.	Ongoing.
Reduce levels of management activities and public access as the fire risk rises. A total ban on public access should be considered during periods of extreme fire risk (this has been used in similar situations but should only be a last resort, in extreme situations.)	As required.
Regular training of Tauranga City Council staff and volunteers in fire control strategies, undertaken to industry standards.	Yearly.
Continue the network of observers, 'phoning tree', and publicised fire reporting procedures. Observers can include residents with clear views of Mauao, boaties, aero clubs, and regular users.	Ongoing.
Close liaison with other fire management agencies, e.g. New Zealand Fire Service and the Department of Conservation. Joint training exercises should be undertaken on Mauao, to ensure that initial attack, in the event of a real fire, is both rapid and effective.	Ongoing.
Control pampas and remove any dry vegetative material, particularly near tracks or easily accessible sites.	As soon as possible and then as required.
REMOVAL OF TREES	
Consult with Heritage New Zealand if there will be any ground disturbance as a result of tree removal.	As required.
Continue to remove trees planted on archaeological features within grazed sections of the reserve.	As required.
Remove exotic trees in MU9.	Ongoing ¹ .
WEED CONTROL	
Control and follow-up control of environmental pest plants in all Management Units.	Six monthly.
Control weeds and release restoration plantings in MU7.	Six monthly until established.
Targeted control of pampas adjacent to tracks (and subsequent removal of dead vegetation).	Six monthly.
Control of weeds in MU3 - boneseed, pampas, radiata pine, brush wattle, boxthorn, gorse and swan plant.	Six monthly until established.

¹ Consultation may be required to determine whether any of the large, mature, exotic specimen trees are of historic significance.



Tasks	Timing
Remove silver poplar around the water reservoir once an indigenous understorey is established.	As required.
Ongoing weed control in sites where pōhuehue planted.	Six monthly.
LANDSCAPE	
Landscape brand development for Mauao.	Consultation, design and implementation over a 1-8 year timeframe.
Develop gateways and formal entrances.	Consultation, design and implementation over a 1-8 year timeframe.
Interpretation panels for sites of significance within the reserve that can be accessed by the general public.	Consultation, design and implementation over a 1-8 year timeframe.
Remove any old or damaged facilities (e.g. seating).	As required.
Consult with Tauranga City Council and establish screen planting (pōhutukawa) adjacent to stock yards (outside of Mauao Historic Reserve boundaries but fits in with the overall look sought within the reserve).	As soon as possible.
GRAZING/STOCK MANAGEMENT	
Monitoring of livestock management regime.	Weekly/monthly basis.
Monitor any changes to archaeological features.	Weekly/monthly basis.
Inspect fences to identify general maintenance requirements regularly as part of management, e.g. fortnightly and after storm events.	Weekly/monthly basis.
Regular maintenance of fences.	Ongoing.
Continue grazing regime to protect archaeological features.	Ongoing.
Gates between paddocks should be closed when not in use for stock movement.	Ongoing.
INFORMATION MANAGEMENT	
Continue to store and save all records information associated with the history and management of Mauao.	Ongoing.
Record work undertaken under each of the actions in this work plan as it is undertaken, and summarise it annually.	Ongoing.
CPTED MANAGEMENT	
Crown lift trees and trim shrubs on the edge of tracks where they restrict sightlines.	As required.
Relocate and update information signs to clearly indicate: track routes, distance from entry and exit points and grade of walk.	Consultation, design and implementation over a 1-8 year timeframe.
Plant low growing species on the track margins to prevent users from deviating from route (preferred plant species are listed in Table 3).	May or August/September.
Plant low growing plant species as an alternative to fencing to remove access to dangerous vantage points and wāhi tapu (preferred plant species are listed in Table 3).	May or August/September.
Keep tracks, seating and facilities well maintained.	Ongoing.
Install more seating.	As required.
Formalise informal tracking.	As required.
VISITOR/PEOPLE MANAGEMENT	
Undertake monitoring and visitor surveys to determine:	
• visitor activities;	Ongoing.
• seasonal patterns of use;	Six monthly.
• assess why people are visiting the reserve - is it for the outdoor experience, physical exercise, views obtained from the site, archaeological features, or perhaps a combination of these experiences.	Once and then 3-5 yearly.
Develop visitor management programme based on above surveys.	Yearly revision.
Implement above.	As soon as possible.
Interpretation panels and pamphlets (update pamphlets regularly).	As required.
Consider enforcing a concession based fee for companies that use Mauao for commercial gain (e.g. tour groups and sporting events).	Under consultation.
Continue to limit the installation of memorials in the Reserve.	Ongoing.



Tasks	Timing
MONITORING	
Archaeology	
Archaeological inspections to assess - livestock management regime; - visitor impacts; and - short and long term changes in impact of vegetation.	Weekly/monthly basis.
Fauna	
Annual possum monitoring.	Yearly.
Rat monitoring.	Bi-annually.
Mustelid and cat monitoring.	Yearly (comparison of inter-year trap catch).
Seabird monitoring.	Yearly (and then every three years).
Fur seal monitoring.	Yearly.
Lizard monitoring.	Initial survey and then as prescribed.
Establish database to record threatened fauna species visiting the reserve.	Ongoing.
Maintain database.	Ongoing.
Annual reporting on pest animal control.	Yearly.
Vegetation	
Establish and measure permanent photopoints (c.30).	Now (and then remeasure 1-3 years).
Establish and measure permanent vegetation plots.	Now.
Remeasure permanent vegetation plots.	Three to five yearly.
Foliar Browse Index (FBI) points/plots.	Now.
Monitor plantings (to determine survival of different species and relative growth rates and threatened plantings).	Ongoing.
RESEARCH	
Undertake or encourage archaeological research to determine if MUs 6 and 7 contain cultivated soils or buried archaeological features. (This research will determine whether it is necessary to maintain this area of grazing or whether parts or all can be planted.)	2016.
Archival and archaeological research (to determine the nature and origin of the archaeological features associated with the stone steps).	Ongoing.
Archaeological research to better understand past inhabitants way of life.	2016.
ROAD, TRACKS, WATER RUN-OFF, VEHICLE ACCESS	
Monitor water run-off management from summit access road, reservoir, and all other tracks and implement maintenance when required.	Ongoing.
Ensure the use of machinery during maintenance of the 4WD access track is closely supervised. (If any ground disturbance is likely to occur in any area that is not already clearly part of the established 4WD track - for example, the establishment of additional culverts - the proposed work should be discussed with Heritage New Zealand in order to determine if an Authority to Modify is required.)	Ongoing.
Regularly inspect tracks to identify general maintenance requirements as part of management.	Fortnightly, and after storm events.
Inspect water run-off systems to identify general maintenance requirements regularly as part of management.	Fortnightly, and after storm events.
Track maintenance - use crushed rhyolite surfacing - ongoing (ensure that shell aggregate is not used).	Ongoing.
Track definition.	Ongoing.
Continue to restrict vehicle use of the summit track.	Ongoing.
PUBLIC USE	
Encourage tangata whenua to provide guided walks for large groups.	
Continue to encourage public use while increasing awareness of cultural, archaeological, ecological and landscapes values on the site through the following (as discussed above): - Interpretation panels. - A high level of maintenance. - Increased public involvement (for example pest control, litter	Ongoing.



Tasks	Timing
control and planting). - CPTED management. - Marketing.	
MANAGEMENT PLAN	
Review Conservation Plans.	Every 10 years, or sooner if required.
Review Management Plan.	Under current consultation.

15. REVIEW OF CONSERVATION PLAN

Ongoing consultation with all relevant parties is imperative during the implementation of this plan. Any management proposals not currently within the scope of this plan will require a change to the plan before the proposals proceed. Changes in management or standards should be discussed and agreed, in writing, by Ngā Poutiriao o Mauao and Heritage New Zealand. This plan should be reviewed by 2025, or sooner if required.

ACKNOWLEDGMENTS

§ 7(2)(f)(iii) (Tauranga City Council) provided project liaison and important discussion with regards to the day to day operations on the maunga.

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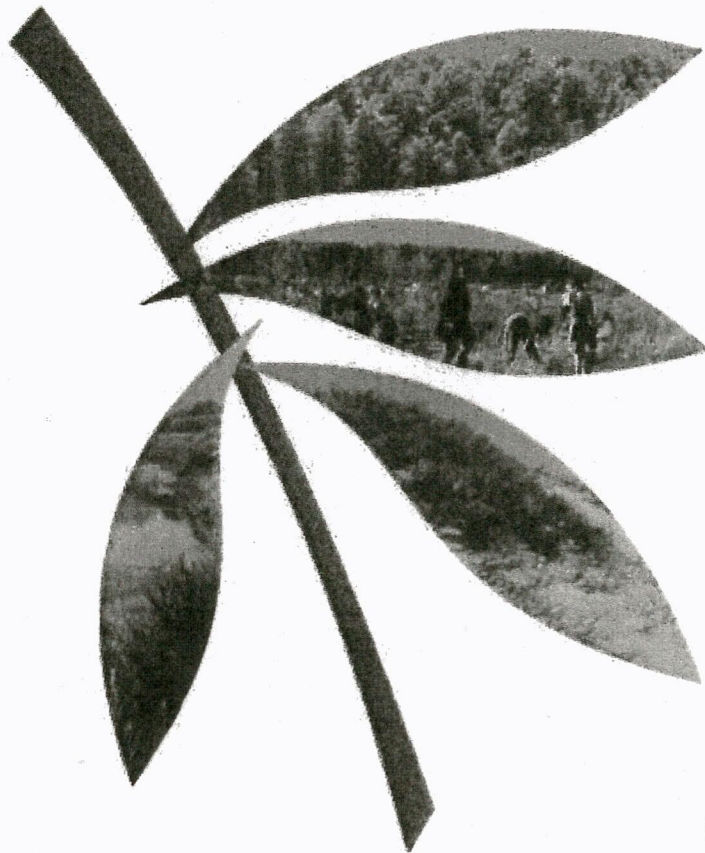
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**CONSERVATION PLAN FOR
MAUAO HISTORIC RESERVE
2015 - VOLUME 2**



providing
outstanding
ecological
services to
sustain
and improve our
environments



Wildlands

R3544a

CONSERVATION PLAN FOR MAUAO HISTORIC RESERVE 2015 - VOLUME 2

Contract Report No. 3544a

July 2015

Project Team:

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- Project manager, site visit, and report review
Site visit, report revision, and update

Prepared for:

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Reviewed and approved for release by:

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VISION, GOALS, OBJECTIVES, AND POLICIES - FROM THE 1998 MANAGEMENT PLAN

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VISION

- All historic resources conserved and effectively managed and woven into the conservation of natural features.
- A place where people may visit to admire and enjoy some of the special gifts and cultural history, provided impacts are minimised.

GOALS

1. To meet the spiritual, cultural, and historical needs of tangata whenua.
2. To protect the landscape character, ecology and historic values of the reserve.
3. To continue to meet the appropriate recreational and amenity needs of the residents and visitors to the District.

OBJECTIVES AND POLICIES

1. GOAL 1

To meet the spiritual, cultural, and historical needs of tangata whenua.

1.1 Objective 1

Place of Cultural and Spiritual Significance

To recognise and provide for the special cultural and spiritual relationships that tangata whenua have with Mauao.

Policy

- 4.1.1a Determine what cultural, heritage and traditional rights or ceremonies are associated with Mauao, e.g. Waitangi Day.
- 4.1.1b Determine a mechanism for implementing the above (4.1.1a) consistent with the Reserves Act 1977.

- 4.1.1c Document a consensus as to the events that would initiate *rāhui self-imposed prohibition* and to make provision, e.g. for conservation purposes.
- 4.1.1d Determine a mechanism for implementing the above consistent with the Reserves Act 1977.
- 4.1.1e To limit the occupancy of Mauao to the public utilities, including the Trig Station, because they are necessary for the health, safety and amenities of the community.
- 4.1.1f To recognise and protect the sanctity of archaeological sites and, in particular to ensure that the tangata whenua determine whether information is released or sought by way of digs (archaeological excavations) on such sites or from silent files.

1.2 **Objective 2**

Heritage Protection

- **To manage the reserve with due recognition to the archaeological significance of Mauao.**
- **To manage the reserve and all sites of cultural significance located within the reserve so that they are protected for the long term.**
- **To carry out specific measures to ensure the long term conservation of the significant sites and areas of Mauao.**
- **To interpret parts of Mauao in consultation with tangata whenua.**
- **To carry out all conservation work in accordance with regard to the guidelines of the ICOMOS New Zealand Charter for the Conservation of Places of Cultural Heritage Value (ICOMOS New Zealand Charter).**

Policy

- 4.1.2a Carry out a detailed historical assessment of Mauao to provide information on the development and use of sites and area. This information will be available for Conservation Plans (see below) and interpretation of the history of Mauao, in consultation with tangata whenua.
- 4.1.2b Prepare a Conservation Plan for the archaeological features and historic areas located in the reserve, commissioned in consultation with the tangata whenua. Such a plan is to include:
 - An inventory of all sites, accurately mapped, described and recorded on a plan. This would be limited to those sites that are already a matter of public record and would not include sites about which the tangata whenua does not wish to divulge information.

- The condition of each site and the presence of vegetation, together with options for its management.
 - An historical assessment of the sites.
 - A review of all documentation and records of existing sites.
 - Detailed policies for the conservation of all sites.
- 4.1.2c A specialist in vegetation management of archaeological sites currently prone to erosion to be consulted during production of a Conservation Plan.
- 4.1.2d A survey of the area's exotic plants and vegetation detailing the types of plants should be carried out, along with documentation of the history. Any work carried out should make reference to recommendations for these planted areas.
- 4.1.2e Prepare a Conservation Plan for the Stone Steps¹. This would document the history, record their current condition, determine the cultural significance of the steps and enable development of conservation policy and actions to ensure their long term retention.
- 4.1.2f Prepare a Conservation Plan for the Iron Wharf area². This should document the site's history including construction of the wharf, water storage tanks and planting of exotic trees, record the site's condition and layout, establish the cultural significance and develop policy for the long term conservation. The New Zealand Archaeological Association recorded the site's layout in 1981. This information will be useful in the Conservation Plan's preparation.
- 4.1.2g Prepare a Conservation Plan for the Stone Jetty³ documenting the history, including construction of the wharf and its use, recording the structure and developing policy for its long term conservation.
- 4.1.2h Assess the degree to which stock are damaging archaeological sites with special attention to be paid to the midden sites on the south western side. If it is found that erosion of the sites is intensified by stock, alternative management should be examined. This could include allowing areas to revert to native bush.
- 4.1.2i The Pilot Reserve area is a site of significance from the post contact period. An assessment of the whole area should be carried out to determine the extent of significant material still on the site from this period, both built structures and occupation of the site. If the terraced area where the cottage stood has not been modified to any great extent, i.e. the ground surface

¹ Not part of the current project.
² Not part of the current project.
³ Not part of the current project.

disturbed to the point that there is no longer any subsurface cultural deposit relating to the occupation of the cottage, the area should be managed as an archaeological site. If the area is shown to be of archaeological interest, it is recommended that no development which is likely to disturb the area is allowed to occur. An explanation of the historic significance of this site should be included in any other interpretative information located on Mauao, together with its relation to other sites.

- 4.1.2j No work should be carried out on Mauao which is likely to destroy, damage or modify any archaeological or historic features. No development (i.e. development of tracks, underground services, fencing, vegetation management such as replanting areas around archaeological features etc.) should be undertaken unless an impact assessment of the proposed activity on the archaeological and historic features is carried out by a qualified archaeologist and tangata whenua are consulted. Any activity will require an Authority to Modify Sites from the New Zealand Historic Places Trust, under Section 11 of the Historic Places Act 1993.
- 4.1.2k Prior to any planting works being carried out on the lower slopes of Mauao, consultation with tangata whenua and an archaeologist is to be undertaken. This consultation will allow for advice on areas of archaeological and cultural sensitivity which should not be planted. Planting should not take place on archaeological features. If sites are to be included in areas for planting it will be necessary to apply to the Historic Places Trust for Authority to Modify Sites, under Section 11 of the Historic Places Act 1993.
- 4.1.2l Further recording and historical research of the disused paths and tracks on the south western slopes of Mauao should be undertaken to reveal any heritage values these tracks may have. When this has been completed, policy should be developed with regard to the long term retention or otherwise of these features in consultation with tangata whenua.

2. **GOAL 2**

To protect the historical values, landscape character, and ecological values of the reserve.

2.1 **Objective 1**

Vegetation

To restore the “cloak¹ of Mauao” whilst sustaining the ecological integrity of Mauao.

¹ Korowai/vegetative cover.

Policy

- 4.2.1a Preserve and protect the existing continuous areas of indigenous vegetation forest and encourage its growth and predominance except where archaeological and other considerations may be paramount.
- 4.2.1b Develop new areas of indigenous vegetation where this will result in the improvement of water quality (springs) and otherwise enhance the habitat value of existing vegetation.
- 4.2.1c Carry out a controlled programme over a period of time to eradicate the radiata pine (*Pinus radiata*) and gorse (*Ulex europaeus*) with the main area of the indigenous forest, and replace this loss with indigenous species.
- 4.2.1d Selectively preserve exotic trees in appropriate locations.
- 4.2.1e Develop wāhi rongonui (groves of coastal vegetation).
- 4.2.1f Ensure that all new plantings of indigenous vegetation are of stock that has been propagated from plants that have evolved genetically in the Tauranga ecological district.
- 4.2.1g Allow sheep to graze parts of Mauao to ensure that grass growth is adequately controlled whilst the public's use of the area is not unduly impeded.
- 4.2.1h Review the need for stocking all grassed areas of the reserve and the options for retiring land from grazing. Planting and fencing of retired areas should be carried out only in consultation and tangata whenua and an archaeologist to ensure that the integrity of archaeological sites is not compromised. If planting is to occur on archaeological sites it will be necessary to apply to the Historic Places Trust for authority to modify sites under Section 11 of the Historic Places Act 1993.
- 4.2.1i To control weeds in accordance with the Bay of Plenty Regional Council's Plant Pest Strategy.
- 4.2.1j To eliminate all gorse within the existing grazed areas so as to reduce the fire hazard.
- 4.2.1k To restore and develop additional planting on Mauao.
 - (a) Restore and add to the coastal vegetation around the base of Mauao, particularly pōhutukawa (*Metrosideros excelsa*).
 - (b) Care should be taken to ensure good view corridors are maintained.
- 4.2.1l To continue to plant indigenous vegetation through gorse areas.

2.2 Objective 2

Fire Control

The Council will take all practical precautions to protect the natural and cultural features of Mauao from fire risk and damage.

Policy

4.2.2a The Fire Plan should be used as an action plan in the event of a fire.

2.3 Objective 3

Fauna

- **To take all necessary measure to protect and enhance the native fauna on Mauao, including the nesting areas of the grey faced petrel and little blue penguin. Consideration will also be given in due course to the release of threatened species on Mauao if consultation determines this is appropriate.**
- **To produce and implement an integrated pest control programme on Mauao for predators and browsers, including ongoing control of the rabbit population.**

Policy

- 4.2.3a To continue the annual monitoring programme for the grey faced petrel and implement appropriate protective measures.
- 4.2.3b To complete, as soon as possible, a comprehensive assessment of the density, diversity and distribution of the fauna.
- 4.2.3c To continue the existing opossum, rabbit and cat control programme, to modify it as required in accordance with the Bay of Plenty's Animal Pest Management Strategy, to carry out an annual review, and to monitor progress.
- 4.2.3d To annually monitor and, if necessary, to control the populations of other introduced fauna that may threatened the vegetation, wildlife or archaeological sites.

2.4 Objective 4

The Summit

- **To prohibit further development or the provision of utilities of any kind on the summit. Maintenance and improvement of existing facilities is acceptable but must be in accordance with Objective 5 of this Management Plan and approved by Council.**

- To protect and preserve the summit's historic and archaeological features.
- To retain its character as a natural lookout.
- To retain its open space character and peaceful atmosphere.

Policy

- 4.2.4a Redesign (if removal is not practical or appropriate) the existing man-made utilities to blend into the landscape as unobtrusively as possible.

2.5 Objective 5

Buildings, Structures and Facilities

- The following existing buildings, structures and facilities on Mauao should be retained: the Hot Salt Water Pools, the Surf Lifesaving Clubhouse, the Farm Service Area, the Public Toilet, and the Camping Ground Facilities. Any changes to existing facilities or proposals for new facilities not included in this Plan must be approved by Council following public consultation, if deemed appropriate by Council.
- To limit the utilities on Mauao to the existing cairn, reservoir, communications repeaters and overhead wires¹. Navigational structures including lights and beacons may be maintained, improved or relocated to meet navigational requirements. Except for those required to ensure public safety, no additional structures or facilities that provide for activities other than recreation or maintenance of the reserve shall be placed on the reserve.
- To continue to allow use of the Pilot Bay Wharf by commercial fishers at the present level.

Policy

- 4.1.5a To actively seek the removal of the abandoned reservoir from the lower slopes provided that an assessment of environmental effects is undertaken to prove that the actions do not compromise the cultural, spiritual and ecological values of Mauao and it is deemed to be practicable.
- 4.1.5b Other facilities to improve public enjoyment of the reserve, such as seats, direction and information signs, and rubbish bins may be provided. These shall be appropriately designed and sited.

¹ And trig station.

VISION FROM THE 2004 CONSERVATION PLAN

Reproduced from Wildland Consultants (2004)

Mauao is preserved as a taonga of exceptional cultural, spiritual, historic, and natural significance.

Mauao shall remain a taonga for all people to enjoy its unique features, while ensuring that impacts are minimised.

GEOLOGY, SOILS, AND LANDFORM UNITS

Reproduced from Wildland Consultants (2004)

GEOLOGY

This section is from Phillips (2003).

Mauao is the remnant of a large lava dome, formed by upwelling and outpouring of viscous rhyolite lava about 4.3 million years ago (Rutherford 1978). Its outline has since been considerably modified by erosion; however, its volcanic origins can still be evidenced by the lava flows that characterise the northern shoreline.

Deep pyroclastic tephra deposits formed the lower slopes of Mauao about 65,000 years ago (Hall 1994) which were subsequently mantled by many airfall volcanic ash deposits from the Ōkataina, Taupō, Maroa, and Tuhua volcanic centres.

The former island of Mauao later became connected to the mainland by a prograding sand spit (tombolo) that also connected the former island of nearby Hopukioire (Mt Drury) (Hall 1994). The tombolo comprises 50 closely spaced parallel dunes of Plio-Pleistocene sediments. The dunes increase in age from east to west and are thought to have begun forming about 6,000 years ago (Pullar & Cowie 1967; see also Dham 1983). A volcanic ash mantle from the Kaharoa eruption of AD 1314 provides evidence that the tombolo had formed completely when Polynesians first arrived at Mauao (Hogg *et al.* 2003). Conclusive archaeological evidence of Polynesian settlement has yet to be identified below Kaharoa Ash.

SOILS

Information was collated from various reports and geological and soils maps.

Most of the steep slopes are covered with Ōtānewainuku series soils, consisting of acidic orthic-allophanic soils derived from a thin rhyolitic tephra. There are also large areas of Katikati series soils on the lower north-eastern and south-western slopes, as well as in the crater, these are from very thin rhyolitic tephra on loess and weathered rhyolitic tephra (Rijkse and Cotching 1993). Soils in the Recreation Reserve have been modified, by man, from their original Ōhope sand; however, this constitutes a relatively small area.

The Katikati sandy loams and Katikati hill soils are present on the broad terrace formations on the lower south-western and north-eastern slopes and on the level summit. These soils are classified as Typic Orthic Allophanic soils derived from thin rhyolitic tephra (Taupō pumice and tuhua tephra). They are characterised by a black gritty sandy loam A Horizon and a yellow brown silt loam B horizon (Rijkse 1995).

The Katikati soils are generally well drained and are used extensively in other parts of Tauranga district for the cultivation of subtropical crops such as kiwifruit and citrus. They

would have been suitable for the cultivation of traditional Polynesian crops during the Maori occupation of Mauao.

LANDFORMS - GENERAL

Mauao is a low mountain (252 m) composed of Pleistocene minden rhyolites (Healy *et al.* 1974). The easy gradient of the lower slopes becomes progressively steeper further upslope, the undulating summit being generally surrounded by rocky precipitous cliffs. Mauao is bounded by sea on three sides; to the north and west it is exposed to the open sea, with Tauranga Harbour to the south. On its eastern side It is connected by a low sand isthmus to the flats and low hills east of Tauranga. The foreshore is generally rocky, with small shell beaches in the north east and sand beaches in the south west. It should also be noted that there are several springs, including one geothermal spring.

Information from Healy, Schofield and Thompson (1974) indicated that landforms could not be derived from differences in the underlying geology. A field survey was undertaken in 1999 and topographical differences were used as the basis for the differentiation of landforms. Landforms were mapped onto an enlarged colour photocopy of an aerial photograph (1:3595; 1999) and notes were collated on the features that characterise each landform unit.

LANDFORM UNITS

There are 10 landform units on Mauao and these are described and mapped in Wildland Consultants 1999 (see Figure 6).

1. Rocky shore

A rocky shore is present around most of the coastal margin of Mauao. The substrate varies from boulders to basal rock headlands

2. Beaches

- (a) sand beach
- (b) shell beach

Sand beaches are present on the southern, harbour facing shores, with shell beaches on the northern, open seaward shores. The beaches are relatively small in extent compared to the extent of rocky shore.

3. Coastal bank

- (a) rock
- (b) debris mantled

A coastal bank is present below the track along the seaward margin, with a debris mantled variant more common than rock bank. A rock bank is present at the northern end of Mauao, exposed to the open sea.



4. Gully system

A gully system is present along the toeslope of Mauao, above the coastal track. It is generally steep (c.20° on average) comprising of a series of small gullies and dividing 'ridges'.

5. Gentle slopes

Gently sloping areas (generally 5-10°) immediately above the gully system at the northern and southern ends of Mauao.

6. Terraced hillslope (cultural)

- (a) higher density terracing
- (b) lower density terracing

Relatively large areas of hillslope terraced by Polynesians for cultivation and settlement. The terracing present in some areas is more prominent and denser than others.

7. Moderately steep to steep slopes

- (a) with extensive slumping
- (b) hummocky surface

Moderately steep to steep slopes (approximately 10-35°) are the predominant landform of Mauao. Boulders are common on the surface, particularly on the eastern slopes. An area in the east shows evidence of extensive slumping.

8. Very steep slopes

- (a) rock bluffs/outcrops
- (b) debris-mantled

Immediately below the summit there is a rim of rock bluffs and outcrops with a slope generally greater than 35°. On the northern face, debris mantled steep slopes extend down to adjoin the gully system. The most extensive area of rock bluffs and outcrops is present in this area.

9. Summit

- (a) hollow
- (b) rim

The summit has been divided into an outer rim, which is relatively flat and undulating, with a hollow in the centre, which is generally of lower elevation than the rim and more sheltered.

10. Roads and tracks



VEGETATION AND HABITAT MAP, AND DESCRIPTIONS

Reproduced from Wildland Consultants (2015)

GENERAL

A detailed vegetation map was prepared in 2014 (Wildland Consultants 2015); this is presented in Volume 1 (Figure 3). The vegetation and habitats types on Mauao comprise a defined area of pasture on the lower slopes with secondary indigenous vegetation (or a mixture of indigenous and exotic species) extending from the pasture margin to the summit. Grazed pasture covers over a third (c.34%) of Mauao. On the western side indigenous vegetation extends from the sea to the summit, with well-developed pōhutukawa forest present in this area. There are areas of pōhutukawa treeland along the northern and southern shorelines, and some patches of exotic treeland and forest on the southern and eastern margins. Pōhutukawa forest, treeland and scrub covers approximately 27% of Mauao. Planted shrubland (with some exotic weeds in the canopy) on the northern and north-western slopes covers an area that was burnt by fire in December 1997 and again in January 2003.

Sixteen broad vegetation and habitat types were identified and mapped (see Figure 3 in Volume 1), and are described below.

Vegetation Type	Area (ha)
1 Pōhutukawa forest	8.0
2 Pōhutukawa/māhoe-mamaku-hangehange forest	12.7
3 Mānuka-(Spanish heath)-(wharariki) shrubland	6.3
4 Mixed exotic-indigenous scrub and shrubland	2.8
5 Māhoe forest and scrub	2.8
6 Pōhutukawa-mixed indigenous species forest, treeland, and scrub	3.8
7 Planted indigenous species forest/scrub/treeland/shrubland	4.8
8 Pōhutukawa treeland	2.7
9 Mixed indigenous species scrub	1.8
10 Mixed exotic and indigenous species forest and treeland	2.4
11 Rocky bluffs	1.0
12 Close-cropped grassland and paths	0.8
13 Rocky promontory	0.2
14 (Wīwī)/bracken-pōhuehue-cocksfoot shrub-grassland	0.1
15 Shallow gully	0.1
16 Pasture	26.1

1. Pōhutukawa forest (8.0 ha)

Pōhutukawa forms a canopy up to c.20 m tall (range 10-20 m) on the upper eastern slopes, lower western and north-eastern slopes of Mauao. Most of the pōhutukawa within this type are large, old trees, although a small patch of forest on the lower north-eastern slopes comprises younger trees with a lower, denser canopy. The understory and ground cover are variable within this type, with four sub-types reflecting these differences described below. All areas of this type are fenced to exclude domestic stock.

- a. Large, old pōhutukawa form a canopy up to c.20 m tall over an understorey dominated by hangehange (*Geniostoma ligustrifolium* var. *ligustrifolium*) and māhoe (*Melicactus ramiflorus* subsp. *ramiflorus*), but with kawakawa (*Piper excelsum* subsp. *excelsum*) locally common, and local tūrepo (*Rhabdothamnus solandri*), and mamaku (*Cyathea medullaris*) scattered throughout. Groundcover species common within this type include pukupuku (*Doodia australis*) and *Adiantum cunninghamii*. Other species present include māpou, mingimingi (*Leucopogon fasciculatus*), heketara (*Olearia rani* var. *colorata*), akepiro (*Olearia furfuracea*), kānuka, and Japanese honeysuckle (*Lonicera japonica*).
- b. Large, old pōhutukawa form a canopy c.18-20 m tall on the lower western and north-western slopes of Mauao. Māhoe and kawakawa are the dominant understorey species and pukupuku and *Adiantum cunninghamii* are the main groundcover species, but other species common within these tiers include hangehange, whauwhaupaku (*Pseudopanax arboreus*), mamaku, māpou, and mingimingi. Spanish heath (*Erica lusitanica*) is common on the margins of tracks that pass through this type. Gaps in the pōhutukawa canopy contain mixed indigenous and exotic species scrub with bracken (*Pteridium esculentum*), māhoe, hangehange, whauwhaupaku, akeake (*Dodonaea viscosa*), mamaku, karamū (*Coprosma robusta*), glossy karamu (*Coprosma lucida*), kawakawa, gorse (*Ulex europaeus*), Spanish heath, and pampas (*Cortaderia selloana*) common and local Japanese honeysuckle, woolly nightshade (*Solanum mauritianum*), and kikuyu (*Cenchrus clandestinus*).

Slips of varying sizes are present throughout this type and are in various stages of revegetation/regeneration. Recent slips have a sparse groundcover of occasional pōhutukawa seedlings and herbaceous species, with occasional pampas and locally common Spanish heath amongst bare clay and rocks. Some areas have been planted with indigenous species, including māhoe, ngaio, glossy karamu, wharariki (mountain flax; *Phormium cookianum* subsp. *hookeri*), tarata (*Pittosporum eugenioides*), whau, and mānuka. Exposed areas beside the base track support patches of wīwī (*Ficinia nodosa*) and *Machaerina juncea*.

Other species present at lower densities within this type include ponga (*Cyathea dealbata*), tūrepo, *Asplenium polyodon*, *A. oblongifolium*, *Oplismenus hirtellus* subsp. *imbecillis*, *Astelia solandri*, and boneseed (*Chrysanthemoides monilifera*).

- c. A small area of pōhutukawa trees form a dense canopy up to c.10 m tall on the north-eastern, lower slopes of Mauao. This area contains a very sparse understorey of glossy karamu and does not support any groundcover species. A small slip on the north-eastern margin of this type supports pōhutukawa seedlings and saplings with patches of grass (predominantly kikuyu), pōhuehue, wīwī, a few pampas (c.6), and gorse.

2. Pōhutukawa/māhoe-mamaku-hangehange forest (12.7 ha)

Large pōhutukawa are locally emergent over a canopy dominated by māhoe, mamaku, and hangehange with a sparse to locally dense understorey of hangehange, ponga, māhoe, māpou, kawakawa, akepiro, and rangiora (*Brachyglottis repanda*). Groundcover species common within this type include pukupuku, rereti (*Blechnum chambersii*), *Asplenium oblongifolium*, *Microsorium pustulatum*, *Blechnum filiforme*, and *Astelia*

solandri. Houhere¹ (*Hoheria sexstylosa*) is locally common in the canopy in parts of this type, and occasional emergent rewarewa, rimu¹, and totara¹ (*Podocarpus totara*) are also present.

Track margins within this type support a range of species. Spanish heath is common; kiokio (*Blechnum novae-zelandiae*), Mexican daisy (*Erigeron karvinskianus*), and climbing asparagus (*Asparagus scandens*) are locally common; and hawthorn (*Crataegus monogyna*), cotoneaster (*Cotoneaster glaucophyllus*), Japanese honeysuckle, gorse, and blackberry (*Rubus fruticosus*) are occasional. Some areas include regenerating koromiko (*Hebe stricta*), pōhutukawa, and houhere in association with *Adiantum cunninghamii*, pukupuku, and gorse.

A small (c.7 × 3 m) patch of Chinese privet (*Ligustrum sinense*) and c.10 hawthorn trees are present near the eastern boundary of this type where it borders Vegetation Type 4 (māhoe forest and scrub) (see Figure 3, in Volume 1). Other species present in this area include climbing asparagus, *Calystegia sepium* × *C. soldanella*, and planted harakeke (*Phormium tenax*).

Other species present within these areas include totara², kōwhai¹ (*Sophora microphylla*), kānuka, ponga, whauwhaupaku, houpapa, kāmahi, rimu, mingimingi, mānuka, Japanese spindleberry (*Euonymus japonicus*), smilax (*Asparagus asparagoides*), Italian evergreen buckthorn (*Rhamnus alaternus*), Chinese privet, pampas, swan plant (*Gomphocarpus fruticosus*), and loquat (*Eriobotrya japonica*).

3. Mānuka-(Spanish heath)-(wharariki) shrubland (6.3 ha)

Shrubland dominated by planted mānuka, with locally common wharariki (planted) and Spanish heath, and scattered pōhutukawa, māpou, and pampas, is present on the upper to mid-slopes on the northern face of Mauao. Bluffs at the top of the slope within this area support Spanish heath, wharariki, radiata pine (*Pinus radiata*) seedlings, and a few pōhutukawa. Other species present include *Pomaderris amoena*, karamū, gorse, tī kōuka (*Cordyline australis*), ngaio (planted), *Hebe parviflora* (planted), *Metrosideros excelsa* × *M. kermadecensis* (planted), broadleaf (*Griselinia littoralis*) (planted), and Montpellier broom (*Teline monspessulana*). *Morelotia affinis* is locally common on exposed track margins. This vegetation type is located within the area of affected by fires in 1997 and 2003.

4. Mixed exotic-indigenous scrub/shrubland (2.8 ha)

This vegetation type is located on the upper, eastern slopes of Mauao. Rocky bluffs are present at the top of the slope on the western side of this vegetation type. The bluffs are surrounded by Spanish heath shrubland with planted wharariki, and scattered gorse, *Pomaderris amoena*, mānuka (planted), and pōhutukawa (planted). Below the bluffs, scrub is present and is dominated by Spanish heath, pampas, and gorse in association with wharariki, pōhutukawa, and mānuka. This vegetation type is located within the area affected by fires in 1997 and 2003. Slips within this type have scattered plants of

¹ All these species are planted, and are not known to occur naturally on Mauao.

² All these species are planted, and are not known to occur naturally on Mauao.



pōhutukawa, pampas, Spanish heath, *Morelotia affinis*, mānuka, gorse, and tūrutu (*Dianella nigra*).

5. Māhoe forest and scrub (2.8 ha)

This type is present on the south-eastern mid-slopes of Mauao. Occasional emergent pōhutukawa are present above a c.6 m tall canopy dominated by māhoe in association with kawakawa and mingimingi. Patches of blackberry and bracken shrubland-fernland and pōhuehue vineland are present within this type, and parts of the lower, southern margins support planted indigenous shrubland. Planted species within these areas include māhoe, whau, rimu, totara, pōhutukawa, and koromiko. Locally, Japanese honeysuckle forms dense vineland, smothering the indigenous canopy. Pampas and blackberry have been controlled near the fenceline. In these areas, a variety of herbs are growing on the bare soil including *Acaena novae-zelandiae*, woolly mullein (*Verbascum thapsus*), Scotch thistle (*Cirsium vulgare*), Californian thistle (*Cirsium arvense*), broad-leaved fleabane (*Conyza sumatrensis*), and scarlet pimpernel (*Anagallis arvensis*). Other species present within this type include māpou, kānuka, English oak (*Quercus robur*), Spanish heath, Chinese windmill palm (*Trachycarpus fortunei*), cotoneaster, sycamore (*Acer pseudoplatanus*), woolly nightshade, sweet briar (*Rosa rubiginosa*), Chinese privet, and Mexican daisy. A single radiata pine tree is present at the northern boundary of this type with Vegetation Type 1a. Some indigenous vegetation (pōhutukawa and māhoe) has been affected by herbicide spray drift during control of pampas, gorse, and blackberry.

6. Pōhutukawa-mixed indigenous species forest, treeland, and scrub (3.8 ha)

Located on the mid- and lower northern slopes of Mauao, natural and planted pōhutukawa form a canopy to c.5 m tall in association with planted ngaio, glossy karamu, mānuka, *Hebe parviflora*, and wharariki. Planted kawakawa, tī kōuka, and nīkau are also present. Little ground cover is present within this area: the parts of this type with a more open canopy support patches of grass and the parts with a closed canopy contain patches of ring fern (*Paesia scaberula*).

7. Planted indigenous species forest/scrub/treeland/shrubland (4.8 ha)

Restoration plantings of mixed broadleaved indigenous species have been undertaken over a number of years in various locations around Mauao. These are often located on the margins of existing vegetation, but also include small gullies. The maturity of the plantings is reflected in the vegetation structure within these areas, as described below:

- a. A small area of forest dominated by pōhutukawa, māhoe, and whau on the eastern mid-slopes of Mauao. Other species present within this area include karaka, rimu, and broadleaf.
- b. Treeland and scrub with natural and planted pōhutukawa in association with planted ngaio, glossy karamu, mānuka, *Hebe parviflora*, and wharariki in a small gully on the eastern lower slopes of Mauao. Planted tī kōuka and nīkau are also present. Rank grassland dominated by Yorkshire fog (*Holcus lanatus*) and kikuyu is present in canopy gaps and some slumping of steep slopes has occurred within this area.

- c. Mixed indigenous species scrub and treeland in a gully with a small stream on the south-western mid- to lower slopes of Mauao. Ngaio, pōhutukawa, harakeke, mānuka, whau, and *Hebe parviflora* represent the bulk of the planted species. Rank grassland is present between plantings.
- d. Pōhutukawa saplings and small trees have been planted within rank grassland on steep lower slopes on the south-western and western sides of Mauao. Some large, old pōhutukawa up to c.16 m tall are also present within this area. Occasional, naturally-occurring patches of māhoe and Japanese honeysuckle are present where parts of this type meet old-growth pōhutukawa forest. Other species present in parts of this type include hawthorn, black wattle (*Acacia mearnsii*), and gorse.
- e. Forest and treeland dominated by kānuka, māhoe, houhere, karamū, whau, pōhutukawa, and koromiko forms a patchy canopy to c.6 m tall over fern, grass, and herb species including milkweed (*Euphorbia peplus*), sow thistle (*Sonchus oleraceus*), woolly mullein, pukupuku, ring fern, *Acaena novae-zelandiae*, browntop (*Agrostis capillaris*), and toatoa (*Haloragis erecta*). Other planted species present include totara, mānuka, māhoe, ngaio, tarata, akeake, and wharariki. Other species present within this type include Japanese honeysuckle, hawthorn, Spanish heath, pampas, and cotoneaster.
- f. Mixed indigenous species scrub and shrubland to c.3 m tall within a triangle formed by the two main tracks to the summit. Ngaio, *Hebe parviflora*, karamū, mānuka, pōhutukawa, and wharariki are the main species planted within this area. Other planted species present include broadleaf, koromiko, glossy karamu, tī kōuka, and kōhūhū (*Pittosporum tenuifolium*). Patches of Spanish heath are also present.
- g. Recently planted seedlings within rank grassland. Planted species present within this area include glossy karamu, wharariki, totara, and mānuka. Other species are likely to have been planted within this area, but are not identifiable as they have died. Wharariki plants are in good condition, glossy karamu plants are in average condition, and totara and mānuka are in poor condition. Rank grass around the plantings has been sprayed.

8. Pōhutukawa treeland (2.7 ha)

Predominantly large, old pōhutukawa form a patchy canopy over a variable groundcover and understory in various places around the lower slopes of Mauao. In some areas, pōhutukawa trees are present over walking tracks or rocks and there are rarely any understory or groundcover species. Other areas have local patches of woody species (seedlings and saplings) and pasture. Woody species present beneath pōhutukawa trees include pōhutukawa, kawakawa, pōhuehue, and glossy karamu. Grass species present include *Rytidosperma* species and Yorkshire fog. Other species present include *Cyperus ustulatus*, *Adiantum cunninghamii*, *Carex* aff. *raoulii* ("raotest"), wīwī, wall lettuce (*Mycelis muralis*), catsear (*Hypochaeris radicata*), hawkbit (*Leontodon taraxacoides*), creeping buttercup (*Ranunculus repens*), and *Isolepis cernua*. *Samolus repens* is present growing amongst wīwī and trampled kikuyu beneath pōhutukawa trees on the seaward side of the track in the northern section of this type.

9. Mixed indigenous species scrub (1.8 ha)

Small patches of remnant scrub are surrounded by planted scrub dominated by mānuka, koromiko, and wharariki on relatively flat land near the summit of Mauao. Remnant patches of scrub contain occasional emergent rewarewa over a c.4-5 m tall canopy dominated by māhoe, hangehange, and pōhutukawa with heketara, mamaku, and karamū common. The ground cover is generally sparse and mostly comprises leaf litter, with scattered kiokio, *Adiantum cunninghamii*, ring fern, and *Asplenium polyodon* also present. Other species present within this type include glossy karamu (planted), akepiro (planted), *Rubus schmidelioides*, mingimingi, miro (*Prumnopitys ferruginea*) (planted), kauri (*Agathis australis*) (planted), *Clematis paniculata*, *Pyrrosia eleagnifolia*, *Machaerina juncea*, *Gonocarpus incanus*, *Tetraria capillaris*, tūrutu, Spanish heath, cotoneaster, Japanese spindleberry, kahili ginger (*Hedychium gardnerianum*), yucca (*Yucca gloriosa*), wilding pine (*Pinus* spp.), and pampas. Some control of pampas and kahili ginger has been undertaken in this area.

Patches of grass are present within this type and informal tracks are common. A small area of *Drosera auriculata* is present within moss on the south-western margins of this type beside the track.

10. Mixed exotic and indigenous species forest/treeland (2.4 ha)

Large, mature indigenous and exotic tree species have been planted on the south-eastern, southern, and south-western lower slopes of Mauao.

- a. Mixed exotic-indigenous treeland at the boundary with the motor camp has a canopy dominated by sycamore (up to c.18 m tall), with clusters of karaka, macrocarpa (*Cupressus macrocarpa*), English oak, radiata pine, Chinese windmill palm, and phoenix palm (*Phoenix canariensis*) over leaf litter and pasture grass with occasional Chinese windmill palm seedlings and saplings, strawberry dogwood (*Cornus capitata*), Chinese privet, and cotoneaster. Other species within this area include smilax, boxthorn (*Lycium ferocissimum*), and tree privet (*Ligustrum lucidum*). This area is not fenced to exclude stock.
- b. Forest dominated by macrocarpa and karaka (up to c.20 m tall) in association with radiata pine, sycamore, and pōhutukawa on the south-eastern boundary of the Reserve. This area contains a variable groundcover and understorey dominated by kawakawa in the understory, but also contains karamū, ring fern, meadow rice grass (*Microlaena stipoides*), Yorkshire fog, cocksfoot (*Dactylis glomerata*), Japanese honeysuckle, cleavers (*Galium aparine*), and sow thistle. Other species present include karo, māhoe, māpou, totara, Indian strawberry, grey sedge (*Carex divulsa*), climbing asparagus, cotoneaster, and Chinese windmill palm.
- c. Treeland within grazed pasture on the southern lower slopes of the Reserve. Tree species present within this area include planted and natural pōhutukawa, and planted totara, karaka, houhere, paulownia (*Paulownia tomentosa*), melia (*Melia azedarach*), sycamore, Lombardy poplar (*Populus nigra 'Italica'*), tree of heaven (*Ailanthus altissima*), English oak, radiata pine, silky oak (*Grevillea robusta*), sheoak (*Casuarina* species), eucalyptus (*Eucalyptus* species), and box alder (*Acer negundo*).

- d. Treeland around a water tower on the southern mid-slopes of Mauao. Tree species present within this area include poplar (*Populus* species), silky oak, pōhutukawa, paulownia, melia, and pūriri.

11. Rocky bluffs (1.0 ha)

Rocky bluffs on the north-western side of Mauao have patches of vegetative cover, predominantly grass, pampas, gorse, *Astelia banksii*, and pōhutukawa. Other species present include boxthorn, swan plant, hawthorn, and *Psilotum nudum*.

12. Close-cropped grassland and paths (0.8 ha)

Vegetation and habitats within this area comprise close-cropped grass dominated by kikuyu with scattered pōhutukawa. Tables, chairs, a trig, and paths are present throughout this area. Spanish heath is present in exposed places. Other species present within this area include ratstail (*Sporobolus africanus*), catsear, gorse, and pampas.

13. Rocky promontory (0.2 ha)

A small rocky peninsula jutting into the ocean on the north-western side of Mauao supports scattered clumps of plants in cracks in the rocks. Plants present include wīwī, *Samolus repens*, *Senecio lautus* var. *lautus*, scarlet pimpernel, and glasswort (*Sarcocornia quinqueflora*). A small area of *Disphyma australe* is also present growing in association with glasswort.

14. (Wīwī)/bracken-pōhuehue-cocksfoot shrub-grassland (0.1 ha)

Occasional kawakawa and local patches of wīwī are emergent within bracken, pōhuehue, and cocksfoot shrub-grassland on the south-western midslopes of Mauao. Other species present include shore bindweed (*Calystegia soldanella*) and *Acaena novae-zelandiae*.

15. Shallow gully (<0.1 ha)

A narrow band of *Cyperus ustulatus* and ring fern tussockland is present at the top of a shallow gully around a seep in the hillslope. Below the tussockland, grazed pasture with horehound (*Marrubium vulgare*), woolly mullein, and prickly sow thistle (*Sonchus asper*) grades into scrub dominated by whau and māhoe with ponga, blackberry, pōhuehue, and kawakawa. Pampas and thistles have been controlled in this area.

16. Pasture (26.1 ha)

Grazed pasture of variable composition is present around the mid- and lower slopes on the north-eastern, eastern, southern, south-western, and western sides of Mauao. Some areas of the pasture are dominated by *Rytidosperma* species and meadow rice grass, whilst other parts are dominated by either Yorkshire fog or kikuyu. Patches of ring fern, woolly mullein, horehound, wīwī, and pōhuehue are common throughout this type. Scattered trees are also present, including totara, pōhutukawa, karaka, and paulownia. Other species present within the pasture include gorse, *Acaena novae-zelandiae*, and *Oxalis exilis*.

LIST OF VASCULAR SPECIES RECORDED ON MAUAO

Reproduced from Wildland Consultants (2015)

Note - All species were observed during 2014 and 2015 site inspections, unless otherwise annotated, e.g. Beadel 2004.

INDIGENOUS**Key**

- * = Occurs naturally at the site
 P = Planted
 N = Naturalised

Gymnosperms

<i>Agathis australis</i> (P)	kauri
<i>Dacrycarpus dacrydioides</i> (P)	kahikatea
<i>Dacrydium cupressinum</i> (P)	rimu
<i>Phyllocladus trichomanoides</i> (Beadel 2004)	tānekaha
<i>Podocarpus totara</i> var. <i>totara</i> (P)	totara
<i>Prumnopitys ferruginea</i> (P)	miro

Monocot. trees and shrubs

<i>Cordyline australis</i> (* P)	tī kōuka, cabbage tree
<i>Rhopalostylis sapida</i> (P)	nīkau

Dicot. trees and shrubs

<i>Brachyglottis repanda</i> *	rangiora
<i>Carmichaelia australis</i> *	maukoro, tainoka, taunoka
<i>Coprosma grandifolia</i> *	kanono, raurēkau, raurākau, manono
<i>Coprosma lucida</i> (* P)	karamū, kāramuramu, glossy karamu
<i>Coprosma repens</i> (* P)	taupata
<i>Coprosma robusta</i> (* P)	karamū, kāramuramu
<i>Coriaria arborea</i> var. <i>arborea</i> *	tutu
<i>Corynocarpus laevigatus</i> (* P)	karaka
<i>Dodonaea viscosa</i> (*? P)	akeake
<i>Entelea arborescens</i> (* P)	whau
<i>Gaultheria antipoda</i> *	tāwiniwini, koropuka, takapo, taupuku
<i>Geniostoma ligustrifolium</i> var. <i>ligustrifolium</i> *	hangehange
<i>Griselinia littoralis</i> (P)	kāpuka
<i>Hebe parviflora</i> (P)	koromiko tāraanga, kōkōmuka tāraanga
<i>Hebe stricta</i> var. <i>stricta</i> (* P)	koromiko, kōkōmuka



<i>Hoheria sexstylosa</i> (P, N)	houhere, lacebark
<i>Knightia excelsa</i> *	rewarewa
<i>Kunzea robusta</i> (* P)	kānuka
<i>Leptecophylla juniperina</i> var. <i>juniperina</i> *	prickly mingimingi
<i>Leptospermum scoparium</i> agg. (* P)	mānuka
<i>Leucopogon fasciculatus</i> *	mingimingi
<i>Leucopogon fraseri</i> *	pātōtara
<i>Melicytus novae-zelandiae</i> (P) (Beadel 2004)	coastal māhoe
<i>Melicytus ramiflorus</i> subsp. <i>ramiflorus</i> (* P)	māhoe
<i>Metrosideros excelsa</i> (* P)	pōhutukawa
<i>Myoporum laetum</i> (P)	ngaio
<i>Myrsine australis</i> *	māpou, matipou, māpau
<i>Olearia furfuracea</i> *	akepiro, tanguru
<i>Olearia paniculata</i> (P)	akiraho
<i>Olearia rani</i> var. <i>colorata</i> *	heketara
<i>Pimelea tomentosa</i> (Beadel 2004)*	
<i>Piper excelsum</i> subsp. <i>excelsum</i> *	kawakawa
<i>Pittosporum crassifolium</i> (* P)	karo
<i>Pittosporum eugenoides</i> (P)	tarata; lemonwood
<i>Pittosporum tenuifolium</i> (* P)	kōhūhū, rautāhiri, rautāwhiri
<i>Pomaderris amoena</i> *	tauhinu
<i>Pseudopanax arboreus</i> *	whauwhaupaku, puahou, five finger
<i>Pseudopanax lessonii</i> (* P)	houpara
<i>Rhabdothermus solandri</i> *	tūrepo
<i>Sophora microphylla</i> (P)	kōwhai
<i>Vitex lucens</i> (P)	pūriri
<i>Weinmannia racemosa</i> *	kāmahi

Dicot. lianes

<i>Calystegia soldanella</i> *	panahi, shore bindweed
<i>Calystegia sepium</i> subsp. <i>roseata</i> *	pōhue
<i>Calystegia sepium</i> × <i>C. soldanella</i> *	
<i>Clematis paniculata</i> *	puawānanga
<i>Muehlenbeckia complexa</i> *	pōhuehue
<i>Parsonsia capsularis</i> *	akakioire
<i>Rubus schmidelioides</i> var. <i>schmidelioides</i> *	tātārāmoa, bush lawyer

Lycopods and psilopsids

<i>Huperzia varia</i> (Beadel 2004)*	whiri-o-Raukatauri
<i>Lycopodium deuterodensum</i> (Beadel 2004)*	puakarimu
<i>Psilotum nudum</i> *	
<i>Tmesipteris elongata</i> *	
<i>Tmesipteris tannensis</i> *	

Ferns

<i>Adiantum cunninghamii</i> *	huruhuru tapairu, maidenhair fern
<i>Adiantum diaphanum</i> *	huruhuru tapairu, maidenhair fern

<i>Asplenium flaccidum</i> *	makawe, ngā makawe o Raukatauri
<i>Adiantum hispidulum</i> *	huruhuru tapairu, maidenhair fern
<i>Asplenium oblongifolium</i> *	huruhuru whenua
<i>Asplenium polyodon</i> *	petako
<i>Blechnum chambersii</i> *	rereti, nini
<i>Blechnum filiforme</i> *	pānako
<i>Blechnum novae-zelandiae</i> *	kiokio
<i>Blechnum parrisiae</i> *	pukupuku
<i>Cardiomanes reniforme</i> (Beadel 2004)	kidney fern, konehu raurenga, kopakopa
<i>Cyathea dealbata</i> *	ponga, silver fern
<i>Cyathea medullaris</i> *	mamaku
<i>Dicksonia fibrosa</i> *	whēkī-ponga, kurīpākā
<i>Dicksonia squarrosa</i> *	whēkī
<i>Histiopteris incisa</i> *	mātātā, water fern
<i>Hymenophyllum demissum</i> (Beadel 2004)*	irirangi, piripiri, filmy fern
<i>Hymenophyllum dilatatum</i> (Beadel 2004)*	matua mauku, filmy fern
<i>Hymenophyllum sanguinolentum</i> (Beadel 2004)*	piripiri, filmy fern
<i>Lygodium articulatum</i> *	mangemange
<i>Microsorium pustulatum</i> *	kōwaowao, pāraharaha, hound's tongue fern
<i>Paesia scaberula</i> *	mātātā
<i>Pneumatopteris pennigera</i> *	pākau
<i>Polystichum neozelandicum</i> subsp. <i>neozelandicum</i> *	pikopiko, shield fern
<i>Pteridium esculentum</i> *	rārahu, bracken
<i>Pteris macilenta</i> *	titipo, sweet fern
<i>Pteris tremula</i> *	turawera, shaking brake
<i>Pyrrosia eleagnifolia</i> *	leather-leaf fern

Orchids

<i>Diplodinium alobulum</i> (Beadel 2004)*	
<i>Drymoanthus adversus</i> *	
<i>Earina autumnalis</i> *	raupeka
<i>Earina mucronata</i> *	peka-a-waka
<i>Microtis unifolia</i> agg.*	
<i>Nematoceras macranthum</i> *	
<i>Nematoceras rivulare</i> (Beadel 2004)	
<i>Pterostylis banksii</i> *	tutukiwi
<i>Thelymitra longifolia</i> *	
<i>Thelymitra pauciflora</i> *	slender sun orchid
<i>Winika cunninghamii</i> *	

Grasses

<i>Deyeuxia avenoides</i> *	
<i>Dichelachne crinita</i> *	plume grass
<i>Echinopogon ovatus</i> *	
<i>Microlaena stipoides</i> *	pātītī, meadow rice grass
<i>Oplismenus hirtellus</i> subsp. <i>imbecillis</i> *	
<i>Poa anceps</i> agg.*	
<i>Poa</i> sp.*	



*Rytidosperma gracile**
*Rytidosperma clavatum**
*Zoysia pauciflora**

Sedges

<i>Carex</i> aff. <i>raoulii</i> ("raotest")*	
<i>Carex breviculmis</i> *	
<i>Carex dissita</i> *	
<i>Carex secta</i> *	pūrei, makura, pūreirei, pūrekireki, pūkio
<i>Carex testacea</i> *	
<i>Cyperus ustulatus</i> f. <i>ustulatus</i> *	toetoe upoko-tangata
<i>Ficinia nodosa</i> *	wīwī
<i>Isolepis cernua</i> *	
<i>Isolepis habra</i> *	
<i>Lepidosperma laterale</i> (Beadel 2004)*	
<i>Machaerina juncea</i> *	
<i>Machaerina sinclairii</i> *	toetoe tūhara, pēpepe
<i>Morelotia affinis</i> *	
<i>Schoenus apogon</i> (Beadel 2004)*	
<i>Schoenus tendo</i> (Beadel 2004)*	wīwī
<i>Tetraria capillaris</i> *	
<i>Uncinia uncinata</i> *	kamu matau a Maui, kamu

Rushes

<i>Apodasmia similis</i> *	oioi
<i>Juncus edgariae</i> *	wi, wīwī
<i>Luzula picta</i> var. <i>picta</i> *	

Monocot. herbs (other than orchids, grasses, sedges, and rushes)

<i>Astelia banksii</i> *	kakaha, pūwharawhara, wharawhara, kōwharawhara
<i>Astelia hastatum</i> *	kahakaha
<i>Astelia solandri</i> *	kōwharawhara
<i>Dianella haemata</i> *	
<i>Dianella nigra</i> *	tūrutu
<i>Lemna disperma</i> (Beadel 2004)*	karearea
<i>Phormium cookianum</i> subsp. <i>hookeri</i> (P)	wharariki, mountain flax
<i>Phormium tenax</i> (P)	harakeke, flax

Composite herbs

<i>Euchiton audax</i> *	
<i>Euchiton japonicus</i> *	
<i>Lagenifera pumila</i> *	papataniwhaniwha
<i>Pseudognaphalium luteoalbum</i> agg. *	pukatea
<i>Senecio hispidulus</i> *	
<i>Senecio lautus</i> var. <i>lautus</i> *	



Dicot. herbs (other than composites)

<i>Acaena novae-zelandiae</i> *	piripiri
<i>Atriplex hollowayi</i> (Beadel <i>et al.</i> 2009 - historic record)*	Holloway's crystalwort
<i>Centella uniflora</i> *	
<i>Dichondra repens</i> *	Mercury Bay weed
<i>Disphyma australe</i> subsp. <i>australe</i> *	horokaka
<i>Drosera auriculata</i> *	sundew, wahu
<i>Galium trilobum</i> *	
<i>Geranium</i> sp.*	
<i>Gonocarpus incanus</i> *	piripiri
<i>Haloragis erecta</i> subsp. <i>erecta</i> *	toatoa
<i>Hydrocotyle heteromeria</i> *	
<i>Lobelia anceps</i> *	punakura
<i>Oxalis exilis</i> *	
<i>Oxalis rubens</i> *	sand oxalis
<i>Peperomia urvilleana</i> *	wharanui
<i>Ranunculus reflexus</i> *	maruru
<i>Samolus repens</i> var. <i>repens</i> *	māakoako
<i>Sarcocornia quinqueflora</i> *	ureure, glasswort
<i>Selliera radicans</i> *	remuremu, rekoreko, raumangu
<i>Solanum americanum</i> *	raupeti
<i>Tetragonia tetragonioides</i> *	kōkihi, rengamutu, rengarenga, tūtae-
<i>Wahlenbergia violacea</i> *	rimuroa

NATURALISED AND EXOTIC SPECIES

Gymnosperms

<i>Cupressus macrocarpa</i>	macrocarpa
<i>Pinus pinaster</i>	maritime pine
<i>Pinus radiata</i>	radiata pine
<i>Pinus</i> sp.	

Monocot. trees and shrubs

<i>Phoenix canariensis</i>	Phoenix palm
<i>Trachycarpus fortunei</i>	Chinese windmill palm
<i>Yucca gloriosa</i>	yucca

Dicot. trees and shrubs

<i>Acacia dealbata</i> (Beadel 2004)	silver wattle
<i>Acacia longifolia</i> (Beadel 2004)	Sydney golden wattle
<i>Acacia mearnsii</i>	black wattle
<i>Acacia sophorae</i> (Beadel 2004)	coastal wattle
<i>Acer negundo</i>	box alder
<i>Acer pseudoplatanus</i>	sycamore maple



<i>Ailanthus altissima</i>	tree of heaven
<i>Alnus glutinosa</i>	common alder
<i>Berberis glaucocarpa</i>	barberry
<i>Brachychiton acerifolius</i>	Illawarra flame tree
<i>Buddleja davidii</i>	buddleia
<i>Casuarina</i> sp.	sheoak
<i>Chamaecytisus palmensis</i>	tree lucerne
<i>Chrysanthemoides monilifera</i>	boneseed
<i>Cotoneaster glaucophyllus</i>	cotoneaster
<i>Cotoneaster simonsii</i> (Beadel 2004; Wilcox and Ecroyd 1984)	Khasia berry
<i>Crataegus monogyna</i>	hawthorn
<i>Dendrobenthamia capitata</i>	strawberry dogwood
<i>Erica lusitanica</i>	Spanish heath
<i>Eriobotrya japonica</i>	loquat
<i>Eucalyptus</i> sp.	eucalyptus
<i>Euonymus japonicus</i>	Japanese spindleberry
<i>Gomphocarpus fruticosus</i>	swan plant
<i>Grevillea robusta</i>	silky oak
<i>Hakea salicifolia</i> (Beadel 2004)	willow-leaved hakea
<i>Hakea sericea</i> (Beadel 2004)	prickly hakea
<i>Jasminum mesnyi</i>	primrose jasmine
<i>Ligustrum lucidum</i>	tree privet
<i>Ligustrum sinense</i>	Chinese privet
<i>Lupinus arboreus</i> (Beadel 2004)	lupin
<i>Lycium ferocissimum</i>	boxthorn
<i>Melia azedarach</i>	melia
<i>Metrosideros kermadecensis</i>	
<i>Nerium oleander</i>	oleander
<i>Paraserianthes lophantha</i>	brush wattle
<i>Paulownia tomentosa</i>	paulownia
<i>Populus alba</i> 'Nivea'	silver poplar
<i>Populus nigra</i> 'Italica'	Lombardy poplar
<i>Populus</i> sp.	poplar
<i>Quercus ilex</i> ¹	holm oak
<i>Quercus robur</i>	English oak
<i>Rhamnus alaternus</i>	Italian evergreen buckthorn
<i>Rhaphiolepis umbellata</i>	Sexton's bridge
<i>Roldana petasitis</i> ¹	velvet groundsel
<i>Rosa rubiginosa</i>	sweet briar
<i>Rubus</i> sp. (<i>R. fruticosus</i> agg.)	blackberry
<i>Senecio angulatus</i>	Cape ivy
<i>Solanum mauritianum</i>	woolly nightshade
<i>Teline monspessulana</i>	Montpellier broom
<i>Teucrium fruticans</i>	
<i>Ulex europaeus</i>	gorse

¹ Present just outside the project area.

Monocot. lianes

Asparagus asparagoides
Asparagus scandens

smilax
 climbing asparagus

Dicot. lianes

*Delairea odorata*¹
Dipogon lignosus (Beadel 2004)
*Hedera helix*¹
Lonicera japonica
Passiflora edulis (Beadel 2004; Wilcox and Ecroyd 1984)
Rumex sagittatus
Senecio angulatus
Vitis sp. (Beadel 2004)

German ivy
 mile-a-minute
 ivy
 Japanese honeysuckle
 black passionfruit
 climbing dock
 cape ivy

Grasses

Agrostis capillaris
Agrostis stolonifera
Aira caryophyllea
Anthoxanthum odoratum
Aristida ramosa (Wilcox and Ecroyd 1984)
Briza minor (Beadel 2004)
Bromus diandrus
Cenchrus clandestinus
Cortaderia jubata (Beadel 2004)
Cortaderia selloana
Cynodon dactylon
Dactylis glomerata
Ehrharta erecta
Holcus lanatus
Lolium perenne
Miscanthus nepalensis
Paratrophis sp.
Paspalum conjugatum (Beadel 2004)
Paspalum dilatatum
Poa annua
Poa pratensis
Schedonorus arundinaceus
Sporobolus africanus
Stenotaphrum secundatum
Vulpia myuros

browntop
 creeping bent
 silver hairy grass
 sweet vernal

 shivery grass
 ripgut brome
 kikuyu grass
 purple pampas
 pampas
 Indian doab
 cocksfoot
 veldt grass
 Yorkshire fog
 rye grass
 Himalaya fairy grass

paspalum
 annual poa
 Kentucky bluegrass
 tall fescue
 ratstail
 buffalo grass
 vulpia hair grass

¹ Present just outside the project area.

Sedges

<i>Carex divulsa</i>	grey sedge
<i>Cyperus congestus</i> (Beadel 2004)	purple umbrella sedge
<i>Cyperus eragrostis</i> (Beadel 2004)	umbrella sedge
<i>Isolepis sepulcralis</i>	

Rushes

<i>Juncus bufonius</i> var. <i>bufonius</i>	toad rush
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Monocot. herbs (other than orchids, grasses, sedges, and rushes)

<i>Arum italicum</i> ¹	Italian arum
<i>Colocasia esculenta</i> (Beadel 2004)	taro
<i>Crocasmia ×crocosmiiflora</i>	montbretia
<i>Hedychium gardnerianum</i>	kahili ginger, wild ginger
<i>Ixia maculata</i> (Beadel 2004)	ixia
<i>Narcissus pseudonarcissus</i> (Beadel 2004)	daffodil
<i>Tradescantia fluminensis</i>	tradescantia

Composite herbs

<i>Arctotheca calendula</i>	cape weed
<i>Bellis perennis</i>	lawn daisy
<i>Cirsium arvense</i>	California thistle
<i>Cirsium vulgare</i>	Scotch thistle
<i>Conyza sumatrensis</i>	broad-leaved fleabane
<i>Crepis capillaris</i>	hawksbeard
<i>Erigeron karvinskianus</i>	Mexican daisy
<i>Gamochaeta calviceps</i>	silky cudweed
<i>Gamochaeta coarctata</i>	purple cudweed
<i>Hypochaeris radicata</i>	catsear
<i>Jacobaea vulgaris</i> (Beadel 2004)	ragwort
<i>Lactuca serriola</i>	prickly lettuce
<i>Leontodon taraxacoides</i>	hawkbit
<i>Leucanthemum vulgare</i>	oxeye daisy
<i>Mycelis muralis</i>	wall lettuce
<i>Senecio bipinnatisectus</i> (Beadel 2004)	Australian fireweed
<i>Senecio sylvaticus</i>	wood groundsel
<i>Sigesbeckia orientalis</i> (Beadel 2004)	Indian weed, punawaru
<i>Soliva sessilis</i> (Beadel 2004)	Onhunga weed
<i>Sonchus asper</i>	prickly puha
<i>Sonchus oleraceus</i>	puha, sow thistle
<i>Taraxacum officinale</i>	dandelion

¹ Present just outside the project area.

Dicot. herbs (other than composites)

<i>Acaena agnipila</i> (Beadel 2004; Wilcox and Ecroyd 1984)	Australian sheep's burr
<i>Acanthus mollis</i> ¹	bear's breeches
<i>Anagallis arvensis</i>	scarlet pimpernel
<i>Aphanes arvensis</i>	parsley piert
<i>Cerastium fontanum</i> subsp. <i>vulgare</i>	mouse-ear chickweed
<i>Dianthus armeria</i> (Beadel 2004)	Deptford pink
<i>Digitalis purpurea</i>	foxglove
<i>Dipsacus fullonum</i>	wild teasel
<i>Duchesnea indica</i>	Indian strawberry
<i>Epilobium ciliatum</i> (Beadel 2004)	tall willow herb
<i>Euphorbia peplus</i>	milkweed
<i>Foeniculum vulgare</i>	fennel
<i>Fumaria muralis</i>	scrambling fumitory
<i>Galium aparine</i>	cleavers
<i>Galium divaricatum</i>	slender bedstraw
<i>Geranium molle</i>	dovesfoot cranesbill
<i>Geranium robertianum</i>	herb Robert
<i>Gomphocarpus fruticosus</i>	swan plant
<i>Hypericum perforatum</i> (Beadel 2004)	St John's wort
<i>Impatiens sodenii</i>	shrub balsam
<i>Linum bienne</i> (Beadel 2004)	pale flax
<i>Lotus pedunculatus</i>	lotus
<i>Lotus suaveolens</i>	hairy birdsfoot trefoil
<i>Marrubium vulgare</i>	horehound
<i>Medicago arabica</i>	spotted medick
<i>Medicago nigra</i>	bur medick
<i>Modiola caroliniana</i>	creeping mallow
<i>Myosotis sylvatica</i>	garden forget-me-not
<i>Nasturtium officinale</i>	watercress
<i>Oenothera stricta</i>	evening primrose
<i>Ornithopus perpusillus</i> (Beadel 2004)	wild seradella
<i>Oxalis</i> sp.	
<i>Physalis peruviana</i> (Beadel 2004)	cape gooseberry
<i>Phytolacca octandra</i>	inkweed
<i>Plantago australis</i>	swamp plantain
<i>Plantago lanceolata</i>	narrow-leaved plantain
<i>Plantago major</i>	broad-leaved plantain
<i>Polycarpon tetraphyllum</i>	allseed
<i>Prunella vulgaris</i>	selfheal
<i>Ranunculus parviflorus</i>	small-flowered buttercup
<i>Ranunculus repens</i>	creeping buttercup
<i>Ranunculus sceleratus</i> (Beadel 2004)	celery-leaved buttercup
<i>Rumex acetosella</i>	sheep's sorrel
<i>Rumex obtusifolius</i>	broad-leaved dock
<i>Sagina procumbens</i>	pearlwort
<i>Silene gallica</i> (Beadel 2004)	catchfly
<i>Solanum chenopodioides</i>	velvety nightshade
<i>Solanum linnaeanum</i> (Beadel 2004)	Apple of Sodom



Solanum marginatum (Beadel 2004)

Solanum nigrum

Solanum tuberosum (Beadel 2004)

Stellaria media

Trifolium pratense

Trifolium repens

*Tropaeolum majus*¹

Urtica dioica

Verbascum thapsus

Verbascum virgatum

Verbena bonariensis

Veronica arvensis

Veronica persica

white-edged nightshade

black nightshade

potato

chickweed

red clover

white clover

garden nasturtium

stinging nettle

woolly mullein

moth mullein

purple-top

field speedwell

scrambling speedwell

¹ Present just outside of survey area.



INDIGENOUS SPECIES POTENTIALLY SUITABLE FOR PLANTING ON MAUAO

Reproduced from Wildland Consultants (2004)

Key

- 1 = Sheltered sites
- 2 = Salt spray zone
- 3 = Rocky outcrops at base of Mauao
- 4 = Gullies on sheltered side of Mauao
- 5 = Sand dunes (limited habitat available)
- 6 = Exposed faces

Gymnosperms

<i>Dacrycarpus dacrydioides</i> (1)	kahikatea
<i>Dacrydium cupressinum</i> (1)	rimu
<i>Podocarpus totara</i> (1)	totara
<i>Prumnopitys ferruginea</i> (1)	miro
<i>Prumnopitys taxifolia</i> (1)	mataī

Monocot. trees and shrubs

<i>Cordyline australis</i> (1,4)	tī kōuka, cabbage tree
<i>Cordyline banksii</i> (1)	tī ngahere, forest cabbage tree
<i>Rhopalostylis sapida</i> (4)	nīkau

Dicot. trees and shrubs

<i>Alectryon excelsus</i> var. <i>excelsus</i> (1)	tītoki
<i>Aristotelia serrata</i> (1)	makomako, wineberry
<i>Beilschmiedia tawa</i> (1)	tawa
<i>Brachyglottis repanda</i> s.s. (1)	rangiora
<i>Carmichaelia australis</i> (1)	makaka, maukoro
<i>Carmichaelia williamsii</i> (6)	
<i>Carpodetus serratus</i> (1)	putaputawētā
<i>Coprosma acerosa</i> (5)	
<i>Coprosma acerosa</i> × <i>C. repens</i> (3)	
<i>Coprosma grandifolia</i> (1)	kanono
<i>Coprosma lucida</i> (1)	glossy karamu
<i>Coprosma repens</i>	taupata
<i>Coprosma robusta</i> (1, 4)	karamū
<i>Coprosma rhamnoides</i> (1)	
<i>Coriaria arborea</i> var. <i>arborea</i> (1)	tutu
<i>Corynocarpus laevis</i>	karaka



<i>Dodonea viscosa</i> (1)	akeake
<i>Dysoxylum spectabile</i> (1)	kohekohe
<i>Entelea arborescens</i> (1)	whau
<i>Fuchsia excorticata</i> (1)	kōtukutuku
<i>Fuchsia perscandens</i> (1)	
<i>Gaultheria antipoda</i> (1)	tāwiniwini
<i>Geniostoma ligustrifolium</i> var. <i>ligustrifolium</i> (1)	hangehange
<i>Griselinia lucida</i> (1)	puka
<i>Hebe stricta</i> var. <i>stricta</i>	koromiko
<i>Hedycarya arborea</i> (1)	porokaiwhiri; pigeonwood
<i>Nightia excelsa</i> (1)	rewarewa
<i>Kunzea robusta</i> (1)	kānuka
<i>Leptecophylla juniperina</i> subsp. <i>juniperina</i> (1)	prickly mingimingi
<i>Leucopogon fasciculatus</i> (1)	mingimingi
<i>Litsea calicaris</i> (1)	mangeao
<i>Melicytus novae-zelandiae</i>	coastal māhoe
<i>Melicytus ramiflorus</i> subsp. <i>ramiflorus</i> (1)	māhoe
<i>Metrosideros excelsa</i> (1, 2, 6)	pōhutukawa
<i>Myoporum laetum</i> (1, 2)	ngaio
<i>Myrsine australis</i> (1)	māpou
<i>Nestegis apetala</i> (1)	
<i>Olearia furfuracea</i> (1)	akepiro
<i>Olearia pachyphylla</i>	
<i>Olearia rani</i> (1)	heketara
<i>Pimelea villosa</i> (5)	
<i>Piper excelsum</i> var. <i>excelsum</i> (1)	kawakawa
<i>Pisonia brunoniana</i> (1)	
<i>Pittosporum crassifolium</i> (1)	karo
<i>Pittosporum tenuifolium</i> subsp. <i>tenuifolium</i> (1)	kōhūhū
<i>Pomaderris kumerahou</i> (1)	
<i>Pomaderris amoena</i> (1)	
<i>Pseudopanax arboreus</i> var. <i>arboreus</i> (1)	whauwhaupaku, five finger
<i>Pseudopanax crassifolius</i> (1)	horoeaka, lancewood
<i>Pseudopanax crassifolius</i> × <i>P. lessonii</i> (1)	
<i>Pseudopanax lessonii</i> (1)	houpara
<i>Rhabdothamnus solandri</i> (1)	taurepo
<i>Schefflera digitata</i> (1)	pate
<i>Solanum aviculare</i> var. <i>aviculare</i> (1)	poroporo
<i>Vitex lucens</i> (1)	pūriri
<i>Weinmannia racemosa</i> (1)	kāmahi

Monocot. lianes

<i>Freycinetia banksii</i> (1)	kiekie
<i>Ripogonum scandens</i> (1)	kareao, supplejack

Dicot. lianes

<i>Calystegia soldanella</i> (5)	panahi
<i>Clematis cunninghamii</i> (1)	ngākau-kiore



<i>Clematis paniculata</i> (1)	puawānanga
<i>Metrosideros diffusa</i> (1)	rātā
<i>Metrosideros fulgens</i> (1)	rātā
<i>Metrosideros perforata</i> (1)	aka
<i>Muehlenbeckia complexa</i> (5)	pōhuehue
<i>Parsonsia capsularis</i> (1)	akakiore
<i>Parsonia heterophylla</i> (1)	
<i>Rubus australis</i> (1)	
<i>Rubus cissoides</i> (1)	tātarāmoa
<i>Rubus schmidelioides</i> (1)	akatataramoa

Ferns

<i>Asplenium oblongifolium</i>	
<i>Blechnum novae-zelandiae</i>	kiokio
<i>Cyathea dealbata</i> (1)	ponga
<i>Cyathea medullaris</i> (1)	mamaku
<i>Dicksonia squarrosa</i> (1)	whekī
<i>Marrattia salicina</i> var. <i>salicina</i> (1,4)	para, kingfern

Grasses

<i>Microlaena stipoides</i> (6)	pātītī, meadow rice grass
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Sedges

<i>Ficinia nodosa</i> (5)	wīwī
<i>Ficinia spiralis</i> (5)	pīngao

Monocot. herbs (other than orchids, grasses, sedges and rushes)

<i>Arthropodium cirratum</i> (1)	rengarenga
<i>Astelia banksii</i> (1,6)	kakaha
<i>Libertia grandifolia</i> (1)	mikoikoi
<i>Phormium cookianum</i> (1,2,6)	wharariki

Dicot. herbs (other than composites)

<i>Euphorbia glauca</i> (5)	
<i>Lepidium oleraceum</i> (5)	
<i>Tetragonia tetragonioides</i> (5)	kokihi

Relative Flammability of Indigenous Plant Species

The following material was obtained from a pamphlet produced by Forest Research in conjunction with the National Rural Fire Authority and the New Zealand Fire Service Commission. Only species suitable for planting on Mauao are listed here.

Flammability Classes



These flammability classes are intended as a guide only. They were derived from expert opinion, and represent a state-of-knowledge summary that will need to be refined in the light of future observations. Species flammability also varies as a result of genetic and environmental factors, so that the flammability of a particular species will depend on age and situation. For example, flammability may increase as a result of drought or other critical fire weather conditions, or mature vegetation could carry greater amounts of dead material, adding to the potential severity of any fire.

- *Low*

Suitable for green breaks or defensible space, but when in the immediate vicinity of structures, there should be at least a 3-4 m break between the crowns to reduce fuel continuity.

Low Flammability Species

<i>Fuchsia excorticata</i>	kōtukutuku
<i>Pseudopanax crassifolius</i>	horoeka, lancewood
<i>Pseudopanax arboreus</i>	five finger, whauwhaupaku
<i>Coprosma robusta</i>	karamū
<i>Coprosma grandifolia</i>	kanono
<i>Geniostoma ligustrifolium</i>	hangehange
<i>Coprosma repens</i>	taupata
<i>Carpodetus serratus</i>	putaputawētā
<i>Corynocarpus laevigatus</i>	karaka
<i>Griselinia lucida</i>	puka
<i>Piper excelsum</i>	kawakawa, peppertree
<i>Solanum aviculare</i>	poroporo

- *Low/Moderate*

Not recommended for planting in green breaks. If planted in defensible space, elevated dead material and litter should be removed regularly, greater than 4 m should be left between tree crowns, and trees or shrubs in this category should not be within 10 m of structures.

Low/Moderate Flammability Species

<i>Hebe stricta</i>	koromiko
<i>Melicytus ramiflorus</i>	māhoe
<i>Aristotelia serrata</i>	makomako, wineberry
<i>Coriaria arborea</i>	tutu
<i>Myoporum laetum</i>	ngaio
<i>Pittosporum crassifolium</i>	karo
<i>Knightia excelsa</i>	rewarewa
<i>Plagianthus regius</i>	mānatu, ribbonwood
<i>Weinmannia racemosa</i>	kāmahi

- *Moderate*

Most of these species produce heavy accumulations of flammable litter and elevated dead material, and/or have flammable green foliage. Not recommended for green breaks or for planting in defensible space.

Moderate Flammability Species

<i>Beilschmiedia tawa</i>	tawa
<i>Cordyline australis</i>	tī kōuka, cabbage tree
<i>Pittosporum tenuifolium</i>	kōhūhū
<i>Dacrydium cupressinum</i>	rimu
<i>Phormium</i> spp.	flax
<i>Dacrycarpus dacrydioides</i>	kahikatea, white pine

- *Moderate/High*

Species may have flammable green foliage and/or produce high levels of litter and elevated fuel. Not recommended for green breaks or defensible space.

Moderate/High Flammability Species

<i>Podocarpus totara</i>	tōtara
<i>Dodonaea viscosa</i>	akeake
<i>Cyathea</i> and <i>Dicksonia</i> spp.	tree ferns
<i>Leucopogon fasciculatus</i>	mingimingi

- *High*

Burn readily at Low/Moderate forest fire danger conditions.

High Flammability Species

<i>Kunzea robusta</i>	kānuka
<i>Leptospermum scoparium</i>	mānuka

FAUNA SPECIES RECORDED ON MAUAO

Reproduced from Wildland Consultants (2015)

Key

- 1 = Recorded prior to 2014 field survey.
 2 = Recorded during the 2014 field survey.
 3 = Recorded in Wildland Consultants (2004).
 4 = Recorded in Wildland Consultants (2008).

MAMMALS**Indigenous**

Arctocephalus forsteri (1) kekeno; New Zealand fur seal

Introduced

<i>Erinaceus europaeus</i> (1)	European hedgehog
<i>Felis catus</i> (1)	cat
<i>Mustela erminea</i> (1)	stoat
<i>Mustela furo</i> (1)	ferret
<i>Mustela nivalis vulgaris</i> (1)	weasel
<i>Oryctolagus cuniculus</i> (2)	European rabbit
<i>Rattus norvegicus</i> (1)	pouhawaiki; Norway rat
<i>Rattus rattus</i> (1)	ship rat
<i>Trichosurus vulpecula</i> (1)	brush-tail possum

BIRDS**Indigenous**

<i>Anthus novaeseelandiae</i> (3)	New Zealand pipit
<i>Chrysococcyx lucidus lucidus</i> (3)	pīpīwharau; shining cuckoo
<i>Gerygone igata</i> (2)	riroriro; grey warbler
<i>Egretta sacra sacra</i> (3)	matuku-moana; reef heron
<i>Eudyptula minor iredalei</i> (1)	kororā; northern little blue penguin
<i>Falco novaeseelandiae</i> (3)	kārearea; New Zealand falcon
<i>Hirundo neoxena neoxena</i> (2)	welcome swallow
<i>Larus dominicanus dominicanus</i> (2)	karoro; southern black-backed gull
<i>Nestor meridionalis septentrionalis</i> (3)	North Island kākā
<i>Petroica macrocephala</i> (2)	tomtit
<i>Phalacrocorax varius varius</i> (2)	kāruhiruhi; pied shag
<i>Porphyrio melanotus melanotus</i> (2)	pūkeko
<i>Prothemadera novaeseelandiae</i> (2)	tūi



Pterodroma macroptera gouldi (1)
Rhipidura fuliginosa (2)
Sterna striata striata (3)
Tadorna variegata (2)
Todiramphus sanctus vagans (2)
Vanellus miles novaehollandiae (2)

ōi, grey-faced petrel
 pīwakawaka, fantail
 tara; white-fronted tern
 pūtangitangi; pari; paradise shelduck
 kōtare; sacred kingfisher; New Zealand kingfisher
 spur-winged plover

Introduced

Acridotheres tristis (2)
Anas platyrhynchos platyrhynchos (2)
Callipepla californica bunnescens
Carduelis carduelis britannica (2)
Columba livia (2)
Fringilla coelebs (2)
Gymnorhina tibicen (2)
Passer domesticus domesticus (2)
Phasianus colchicus (2)
Platycercus eximius (2)
Sturnus vulgaris vulgaris (2)
Turdus merula merula (2)
Turdus philomelos (2)

common myna
 mallard
 California quail
 European goldfinch
 rock pigeon
 chaffinch
 Australian magpie
 house sparrow
 common pheasant
 eastern rosella
 common starling
 Eurasian blackbird
 song thrush

HERPETOFAUNA

Indigenous

Oligosoma smithii (4)

shore skink



TANGATA WHENUA ISSUES - FROM THE 1998 MANAGEMENT PLAN

Reproduced from Wildland Consultants (2004)

NGĀI TERANGI/NGĀTI PUKENGA, FISHER 1995

Tangata whenua issues report

Mana affected by vesting of maunga in the Crown.

Vision Statement

“Our vision therefore is one that sees the mana of the tangata whenua of Tauranga Moana restored by the return of Mauao to tangata whenua ownership. It is one that sees Mauao continuing to meet the spiritual and cultural needs of the tangata whenua, as well as the recreational and amenity needs of the wider Tauranga community, but without compromising the cultural values of the tangata whenua. Our vision is also one that sees the Tauranga community valuing Mauao as a taonga of exceptional significance to the region and working to actively promote and protect that status” (p4)

Issues

- Claims by tangata whenua to the ownership of Mauao.
- The future use of, and access to, Mauao - should continue to meet needs.
- The practical application of partnership in the management of Mauao - tangata whenua must be actively involved in all levels of decision-making.
- The need to understand and promote the unique and special relationship that tangata whenua have with Mauao - this special relationship must be encapsulated in the management plan, and in the actual management of Mauao.
- Respecting the cultural heritage value of Mauao to the tangata whenua of Tauranga Moana.
- Recognition of the amenity/commodity value of Mauao; the tensions that may exist between those values and cultural heritage values; and managing those tensions.
- The need to preserve and enhance the cultural heritage, amenity/commodity, and environmental/conservation values of Mauao.
- There must be a commitment to the management of Mauao.

- Management goals and objectives must be realistic and workable and must seek to give effect to the aspirations of tangata whenua.

Discussion

Management Plan should be “portable” across different administration and ownership regimes.

The principle of partnership extends to the practical application of the management functions, including decision-making, in respect of the maunga. The inclusion of the tangata whenua of Tauranga Moana as a legitimate and active partner in the management of Mauao is one simple but powerful acknowledgment of the special affinities of Ngāi Te Rangi, Ngāti Ranginui, and Ngāti Pūkenga with Mauao (p8).

“...Tangata whenua do not consider that they should be regarded as one of a number of different sections of the public with an interest in Mauao” (p8) - RMA provisions cited.

“For both tangata whenua it is essential that the wider Tauranga community understands and appreciates the deep attachment that the tangata whenua of Tauranga Moana have with Mauao. The maunga is steeped in legend; it occupies a very significant place in the tribal histories of the tangata whenua, and is one of the principal ways by which tribal identity and rohe is confirmed.” (p9)

- Favour information pavilion at the base of Mauao as a way of conveying information to the general public. Not a tourist information centre.
- No signage drawing attention to archaeological features - fear of desecration.
- Protection of shell middens from damage.
- Any current or proposed amenity/commodity activities that put at risk the heritage and conservation values of Mauao must be discontinued (p11).
- Management and implementation goals and objectives must be realistic and workable, and must seek to give effect to the aspirations of the tangata whenua. Ngāi Te Rangi and Ngāti Pūkenga believe that, in general, these aspirations are in conflict with those of the wider Tauranga community if we accept that one of the underpinning principles to the management of Mauao is preservation and enhancement. (p11).

Recommendations on Issues

“... Ngāi Te Rangi and Ngāti Pūkenga believe that restoration of the mana of the tangata whenua can be achieved in part by the TCC actively involving the tangata whenua of Tauranga Moana in the management of Mauao at all levels.” (p11)

Desired structure - joint Mauao Management Committee - 6 tangata whenua /4 TCC.

- Role to oversee implementation of the Mauao Management Plan.



- Carry out specific management functions (including decision-making, control of activities).
- Make recommendations to TCC.
- Information pavilion at the base of Mauao - hand out information, self-guiding or guided walking tours.
- No signage on archaeological sites.
- Conservation of middens.
- Archaeological surveys of Mauao are not favoured. However, where work is to be undertaken to mitigate damage to existing sites, or where maintenance work of other than a routine or minor nature is to be undertaken (e.g. excavating for carriageway repairs), an archaeological assessment and report is to be carried out. For major programmes (e.g. flora/fauna reinstatement and vegetation removal) a cultural assessment of appropriate sections of Mauao must be undertaken in conjunction with the tangata whenua." (p15)

"It is accepted that the retention of the existing grassed (pasture) areas are appropriate in terms of management. Exotic vegetation in these areas should, however, be removed and replaced with native vegetation."

Restoration of puna required.

Vehicle access to the summit or around Mauao is to be prohibited except for approved maintenance and other approved purposes. The objective here is that Mauao is for pedestrian traffic only. Toilets and refreshment facilities, or any other structures, are to be prohibited on Mauao. The exception is any structure that informs and enhances the cultural and spiritual sanctity of the maunga.

Ngai Te Rangi and Ngāti Pūkenga would like to have a tourism management plan for Mauao developed by Council in partnership with the tangata whenua of Tauranga Moana. Properly maintained walking tracks, observation points, and information on areas of interest will act as an appropriate means of pedestrian management.

"Mauao is tired and has been neglected. As a taonga it needs to be cared for."

NGĀTI RANGINUI - PIAHANA 1995

Tangata whenua Issues Report

The following issues are representative of the concerns of Ranginui.

- Recognition of the status and position of Te Waka Takitimu and the associated heritage and cultural rights of Ngāti Ranginui as tangata whenua.
- Restoration of Mauao consistent with its mana.



- The extent and nature of management rules and functions transferred to tangata whenua.
- The protection of historical sites.
- The reinstatement of Mauao as a historical reserve.
- The restoration of cultural and heritage relationships and give practical effect to use rights.

“To state: “Ko Mauao te Maunga” is tantamount to “I am Mauao” - that the essential ancestral aspects of an individual’s identity is inextricably tied to Mauao.” (p2)

“... the amenity value of a calm, peaceful, place of retreat, reminisce and reflection should be promoted.” (p3)

Reserves Act does not meet or facilitate tangata whenua aspirations to exercise greater authority and control over Mauao.

The environment is sufficiently volatile to act as an obstacle to joint participation and management of Mauao (relationship between tangata whenua due to competing Wai claims for Mauao).

Reinstate Maori nomenclature.

Ranginui, for example, might have the responsibility for restoring and enhancing the summit area, with the opportunity to negotiate agreements to develop concepts and complete work in that area. Tangata whenua seek to re-establish natural relationships with Mauao based on their culture.

Tangata whenua envisage the removal of all exotic vegetation on Mauao and the reinstatement of native vegetation with the aim of restoring the mountain to its pre-European state. This is with the exception of areas of pasture which tangata whenua accept are appropriate in terms of current management. (Ngāti Ranginui wants a programme of eradication of exotics where they threaten or inhibit re-colonisation of indigenous vegetation). A programme of restoration and beautification would include the creation of a native forest reserve as a conservation, recreational, and educational feature. This programme of restoration would focus on the existing forest area on the upper slopes extending to other areas where appropriate to soften the delineation between forest and pasture areas.

As part of the restoration programme, Ngāti Ranginui see the opportunity to establish new sites of cultural significance with specific protections and established work programmes. These sites would come to develop their own identity and act as mnemonics to hapū history, identity, and events. These sites may include the following:

- Wāhi Tiraha - places set aside including the dominant stands of pōhutukawa, ponga, rewarewa, and areas with specimens of rakau.

- Wāhi Rongonui - re-established coastal groves of trees and shrubs including pūriri, rata, tarata, tī kōuka, raukawa, kohurangi, koromiko, rangiora, akiraho tanguru, harakeke, and ngaio.
- Wāhi Ngawari – “living reserves” where families are able to be ‘in the embrace of the mountain’. These areas may include the foreshore area from Stoney Point to Pilot bay or a re-developed camping ground.
- Wāhi Whakatau – the summit. Ngāti Ranginui would like this to remain as an open space with restoration of surfaces dissected by vehicle road way.
- Taumata – lookouts and vantage points.

Ngāti Ranginui would like to establish and enhance the flora of Mauao consistent with local coastal habitats as part of a restoration plan aimed at enhancing plant diversity and preferably incorporate plantings of the following species:

Koromiko, karo, kiekie, horoeka, tete a weka, kohekohe, kowharawhara, kaikōmako, harakeke, raukawa, tanguru, nikau, puka, tītoki, tōwai, maire, akiraho, neinei, rata, māpou, tūrepo, māhoe, pūriri, ngaio, kawakawa, rangiora, wharangi, tawapou, and puahou.

Other specific recommendations from Ngāti Ranginui are as follows:

- That the lower north and eastern face around the fenceline on the south face to a level between 40-50 m is planted with coastal shrubs and herbs.
- That pōhutukawa should predominate within the lower coastal fringes (to 20-30 m) with the long-term effect on an avenue of pōhutukawa.
- That the two gullies immediately above the camping ground to the seaward side of the fenceline aligned with Ocean Beach Road are forested to create ‘fingers’ of coastal forest extending to the existing tree line.
- That open spaces on the inner harbour side below Summit Road are maintained and that gully to the Pilot Bay side of Kinonui’s pa is planted.
- That the karaka groves above the old stone jetty and Pilot wharf are extended.
- The progressive removal of exotic vegetation from the area of trees adjacent to Stoney Point and the extension of the stands of karaka with the inclusion of pūriri.
- The restoration of the gully immediately above Pilot Bay wharf to the summit with a view to planting a more diverse range of trees and shrubs.
- The screening of the reservoir and removal of a line of trees immediately below it.
- The establishment of wide fire breaks where gorse and scrub butts up to native stands.

It is anticipated that a programme of upgrading walkways would be developed where walkways would complement the natural features of Mauao and avoid ‘scarring’ and where existing ‘scarring’ is mitigated with plantings of low to medium height indigenous vegetation. Ngai Te Rangi and Ngāti Pūkenga oppose the development of new walkways with the exception of those that are considered necessary in terms of management. Ngāti Ranginui would like to see Summit Road downgraded to a pedestrian path with plantings along the roadside on the lower slopes to consolidate the edge. Ngāti Ranginui have also suggested that paths are closed during fires season to reduce fire hazards.

Tangata whenua also foresee the reinstatement of degraded waterways and springs in conjunction with vegetation reinstatement and Ngāti Ranginui envisage the creation of ponding areas to enable collection and use.

It is expected that the management plan would include actions to contain and then eliminate animal pests including possums, rabbits, and feral cats from Mauao. Tangata whenua would also like to see the elimination of pest plants from Mauao; however anticipate that the removal of gorse may need to be phased over a longer period in view of its usefulness as a nurse crop for native seedlings. Removal of pest plants from the upper slopes may also need to be phased over a longer period.

It is anticipated that the management plan will preserve and enhance the outstanding environmental and conservation values of Mauao with the long-term view of the re-instatement of the Historical Reserve status.

Historically, policy methodology has focussed on the perceived needs of tangata whenua (to have their history, settlement story told) rather than the expressed need (to regain authority, mana and an intrinsic relationship with their ancestral mountain) (p.13).

"The summit requires interpretative work, and restoration of surfaces dissected at the summit by vehicle roadway. This should be maintained as an open space, utilising the environment for natural shade and shelter from the wind." (p14)

Also favour information pavilion idea.

- Pouwhenua and tuahu.
- No further archaeological excavations.
- Protect middens.
- Remove bath water troughs from near Kinonui Pa.
- Downgrade roadways.

MODIFICATION OF ARCHAEOLOGICAL SITES

Any modification of archaeological sites, regardless of scale, requires formal approval from Heritage New Zealand who are governed by the Heritage New Zealand Pouhere Taonga Act 2014. The following selected sections set out legal requirements and information about the process to be followed to obtain an appropriate consent.

HERITAGE NEW ZEALAND POUHERE TAONGA ACT 2014

Part 3

Protection of places and areas of historical and cultural value

Subpart 2 - Archaeological sites

Overarching protection for archaeological sites

42 - Archaeological sites not to be modified or destroyed

- (1) Unless an authority is granted under section 48, 56(1)(b), or 62 in respect of an archaeological site, no person may modify or destroy, or cause to be modified or destroyed, the whole or any part of that site if that person knows, or ought reasonably to have suspected, that the site is an archaeological site.
- (2) Subsection (1) applies whether or not an archaeological site is a recorded archaeological site or is entered on -
 - (a) the New Zealand Heritage List/Rārangī Kōrero under subpart 1 of Part 4; or
 - (b) the Landmarks list made under subpart 2 of Part 4.
- (3) Despite subsection (1), an authority is not required to permit work on a building that is an archaeological site unless the work will result in the demolition of the whole of the building.

Applications

44 - Applications for authorities

The following applications may be made by any person to Heritage New Zealand Pouhere Taonga:

- (a) an application for an authority to undertake an activity that will or may modify or destroy the whole or any part of any archaeological site or sites within a specified area of land, whether or not a site is a recorded archaeological site or is entered on the New Zealand Heritage List/Rārangī Kōrero or on the Landmarks list:

- (b) an application for an authority to undertake an activity that will or may modify or destroy a recorded archaeological site or sites, if the effects of that activity on a site or sites will be no more than minor, as assessed in accordance with section 47(5):
- (c) an application for an authority to conduct a scientific investigation of an archaeological site or sites within a specified area of land, whether or not a site is a recorded archaeological site or is entered on the New Zealand Heritage List/Rārangi Kōrero or on the Landmarks list.

45 - Application for approval of person to carry out activity

- (1) At any time before an activity in relation to an archaeological site is carried out under an authority, the person applying for the authority (or the holder of an authority) must apply to Heritage New Zealand Pouhere Taonga for approval of any person nominated to undertake the activity under an authority.
- (2) A person must not be approved to carry out an activity under subsection (1) unless Heritage New Zealand Pouhere Taonga is satisfied that the person -
 - (a) has sufficient skill and competency, is fully capable of ensuring that the proposed activity is carried out to the satisfaction of Heritage New Zealand Pouhere Taonga, and has access to appropriate institutional and professional support and resources; and
 - (b) in the case of a site of interest to Māori:
 - (i) has the requisite competencies for recognising and respecting Māori values; and
 - (ii) has access to appropriate cultural support.
- (3) If it is necessary at any time, and for any reason, to replace the person approved to carry out an activity under an authority, the holder of the authority must, by written application to Heritage New Zealand Pouhere Taonga, seek approval for another nominated person to carry out that activity.
- (4) Heritage New Zealand Pouhere Taonga must -
 - (a) determine an application under subsection (1) or (3) in accordance with this section not later than 10 working days after receiving it; and
 - (b) notify the applicant, and any other person directly affected, of the determination as soon as practicable.
- (5) Despite subsection (4)(a), if an application for approval under this section is made concurrently with an application under Section 44, the determination and notification of both applications must be made within the relevant time period specified in Section 50.

GLOSSARY OF PLANT NAMES

akatataramoa	<i>Rubus schmidelioides</i>
akeake	<i>Dodonea viscosa</i>
akepiro	<i>Olearia furfuracea</i>
barberry	<i>Berberis glaucocarpa</i>
bead tree	<i>Melia azedarack</i>
bidibid	<i>Acaena novae-zealandiae</i>
black nightshade	<i>Solanum nigrum</i>
blackberry	<i>Rubus fruticosus</i> agg.
brush wattle	<i>Albizia lophantha</i>
catsear	<i>Hypochoeris radicata</i>
cleavers	<i>Galium aparine</i>
climbing asparagus	<i>Asparagus scandens</i>
cocksfoot	<i>Dactylis glomerata</i>
cotoneaster	<i>Cotoneaster glaucophyllus</i> f. <i>serotina</i>
eucalyptus	<i>Eucalyptus</i> sp.
fleabane	<i>Conyza sumatrensis</i>
gorse	<i>Ulex europeaus</i>
harakeke	<i>Phormium tenax</i>
hangehange	<i>Geniostoma rupestre</i> var. <i>ligustrifolium</i>
hawthorn	<i>Crataegus monogyna</i>
houhere	<i>Hoheria populnea</i>
houpara	<i>Pseudopanax lessonii</i>
huruhuruwhenua	<i>Asplenium oblongifolium</i>
inkweed	<i>Phytolacca octandra</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
kahikatea	<i>Dacrycarpus dacrydioides</i>
kakaha	<i>Astelia banksii</i>
kānuka	<i>Kunzea robusta</i>
karaka	<i>Corynocarpus laevigatus</i>
karamu	<i>Coprosma robusta</i>
karo	<i>Pittosporum crassifolium</i>
kawakawa	<i>Piper excelsum</i> var. <i>excelsum</i>
kikuyu grass	<i>Cenchrus clandestinus</i>
kiokio	<i>Blechnum novae-zelandiae</i>
koromiko	<i>Hebe stricta</i>
kōwaowao	<i>Phymatosorus pustulatus</i>
Lombardy poplar	<i>Populus canadensis</i>
macrocarpa	<i>Cupressus macrocarpa</i>
māhoe	<i>Melicytus ramiflorus</i> subsp. <i>ramiflorus</i>
mamaku	<i>Cyathea medullaris</i>
mānuka	<i>Leptospermum scoparium</i>
māpou	<i>Myrsine australis</i>
mingimingi	<i>Leucopogon fasciculatus</i>
ngaio	<i>Myoporum laetum</i>



oioi
 pampas
 paspalum
 paulownia
 phoenix palm
 pōhuehue
 pōhutukawa
 ponga
 poplar
 pukupuku
 pūniu
 purpletop
 radiata pine
 rangiora
 rārahu
 ratstail
 rewarewa
 Scotch thistle
 silky oak
 similax
 Spanish heath
 Sycamore
 tall fescue
 tarata
 taupata
 tūrepo
 tōtara
 tree of heaven
 turawera
 tūrutu
 whau
 whauwhaupaku
 woolly mullein
 woolly nightshade

Leptocarpus similis
Cortaderia selloana
Paspalum distichum
Paulownia tomentosa
Phoenix canariensis
Muehlenbeckia complexa
Metrosideros excelsa
Cyathea dealbata
Populus sp.
Blechnum parrisiae
Polystichum neozelandicum subsp. *neozelandicum*
Verbena bonariensis
Pinus radiata
Brachyglottis repanda
 bracken; *Pteridium esculentum*
Sporobolus africanus
Knightia excelsa
Cirsium vulgare
Grevillea robusta
Asparagus asparagoides
Erica lusitanica
Acer pseudoplatanus
Schedonorus arundinaceus
Pittosporum eugenoides,
Coprosma repens
Rhabdothamnus solandri
Podocarpus totara
Ailanthus altissima
Pteris tremula
Dianella nigra
Entelea arborescens
Pseudopanax arboreus
Verbascum thapsus
Solanum mauritianum



GLOSSARY OF MĀORI WORDS USED IN THIS PLAN

All translations have been derived from the Māori Dictionary Online
(<http://www.maoridictionary.co.nz/>)

Māori	English
Hapū	Subtribe
Iwi	Tribe
Kaitiaki	Guardian
Kaumātua	Elder
Kororā	Blue penguin
Korowai	Cloak
Mana	Prestige
Marae atea	Courtyard, public forum - open area
Mauao	Mount Maunganui
Maunga	Mountain
Mauri	Special nature
Ngā Poutiriao o Mauao	Guardians of Mauao; Joint administration board including the four iwi of Tauranga Moana and Tauranga City Council
Ōi	Grey-faced petrel
Pā	Fortified village
Pouwhenua	Post marker of ownership
Puna	Water spring
Purakau	Story
Pūrākau	Legends
Rāhui	To put in place a temporary prohibition
Rakau	tree, stick
Rangatiratanga	Chieftainship, right to exercise authority
Rongonui	Well known
Tangata whenua	Local people, hosts, indigenous people
Taonga	Treasure, anything prized
Tapu	Scared
Tauparapara	Speeches
Te Taumata o Mauao	The summit of Mauao
Tikanga	Tradition
Tohunga	Skilled person, chosen expert
Tūāhu	Scared place
Tūāhu	Sacred place for ritual practices by a tohunga
Wāhi tapu	Sacred place, sacred site
Waiata	Song
Whakataukī	Proverb
Whānau	Family
Whāriki	To cover with a mat, floor covering, ground cover
Whenua	Land