

Fitzgerald River National Park Coastal Walk Trails



Dieback Management Plan

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South Coast Region
Department of Parks and Wildlife



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1 INTRODUCTION

The Fitzgerald River National Park (FRNP) is the largest conservation reserve in southwest Western Australia that is currently still relatively free of *Phytophthora cinnamomi* infestations. *Phytophthora cinnamomi* is one of the most significant threats to the biodiversity of the park and therefore preventing its introduction and further spread is one of the primary objectives for DPaW in managing the park (CALM 1991).

Previous to the Fitzgerald River National Park Improvement Project (2009-2013) (FRNP-IP), there was an informal walking route along the coastline of the park, but it was not widely advertised or used. The route was not designed or subject to any specific management to avoid risks associated with the introduction of *Phytophthora cinnamomi* and human-interaction issues associated with the high number of unique, endemic and conservation significant terrestrial fauna and flora of the park (Ecoscape 2010). Therefore the coastal walk trails, the Mamang Trail from Point Ann to Fitzgerald Inlet and the Hakea Trail from Cave Point to Quoin Head, were developed as part of FRNP-IP to provide a recreation and conservation experience. These walk trails provide access to significant biologically rich areas of the park that are otherwise not accessible for the general park visitor, therefore preventing the introduction of *Phytophthora cinnamomi* is of utmost priority for the management of these trails.

1.1 Scope

This FRNP Coastal Walk Trails Dieback Management Plan provides *Phytophthora* dieback management guidelines for the ongoing operation of the Hakea and Mamang walk trails and the coastal wilderness walking route in the Fitzgerald River National Park. The construction of the Hakea and Mamang walk trails followed strict dieback hygiene protocols that were detailed in the '*Fitzgerald River National Park Improvement Project Walk Trails Environmental Management Plan 2012-2013*'.

This Dieback Management Plan relates to the prevention of the introduction and spread of dieback disease caused by a *Phytophthora* pathogen. There are over 35 *Phytophthora* species known from Western Australia, seven of which have been identified in the FRNP. The impacts of most of the *Phytophthora* species are poorly understood, except that *Phytophthora cinnamomi* has the most devastating and long lasting impacts. *Phytophthora cinnamomi* is therefore the focus of this Plan, but the Plan does relate to all *Phytophthora* species and other known pathogens (e.g. *Armillaria luteobubalina*) causing dieback of native plants in the park.

This Plan has been developed to meet condition 9 (Dieback Management Plan) of Ministerial Statement 884 issued on 22 December 2011 for the Coastal Walk Trail from Point Ann to Hamersley Inlet – Fitzgerald River National Park. This condition required a Dieback Management Plan to be developed and implemented for the proposal with the objective: '*to ensure that Phytophthora dieback disease is not introduced into uninfected areas of the Fitzgerald River National Park during the ongoing management of the proposal*'.

This Plan has also been developed to meet the Australian Government's conditions on the broader FRNP-IP following referral by DPaW under the *Environmental Protection and Biodiversity Conservation Act 1999*. This referral was determined to be 'not a controlled action if undertaken in a particular manner', which included '*There must be no further spread of dieback to special environmental areas as a result of the development, its associated activities and/or its consequential impacts*'.

1.2 Interaction with Other Planning and Management Processes

The FRNP is managed by DPaW under the park's current management plan, *Fitzgerald River National Park Management Plan 1991-2001* (CALM 1991). The *Phytophthora* Dieback risks to the park have changed since the writing of the Park Management Plan as additional infestations of *Phytophthora cinnamomi* have been identified in and surrounding the park, though these have not been as a result of the FRNP IP development. Therefore a *Fitzgerald River National Park Dieback Protection Plan* (DPaW in prep.) is currently being written. The Park Dieback Protection Plan will not replace the dieback management prescriptions in the Park Management Plan, but will provide updated management actions for the changed situation.

This FRNP Coastal Walk Trail will form a section of the *Fitzgerald River National Park Dieback Protection Plan* (DPaW in prep.), providing specific management actions for the FRNP coastal walk trails, which were not developed at the time of writing of the Park Management Plan. This FRNP Coastal Walk Trails Dieback Protection Plan will therefore operate in conjunction with the Park Management Plan and the Park Dieback Protection Plan, and is to be used as a tool to guide DPaW works planning and budgeting for the park.

This Dieback Management Plan will be publicly available (as required by condition 9-5 of Statement 884) on the DPaW website and from the DPaW Albany Office.

2 OBJECTIVES

The objectives of this FRNP Coastal Walk Trails Dieback Management Plan are:

- Minimise the risk of *Phytophthora* Dieback being introduced into the Fitzgerald River National Park as a result of the use and management of the coastal walk trails.
- Early detection of, and effective management of, any *Phytophthora* Dieback introduced into the Fitzgerald River National Park which has the potential to impact the coastal walk trails.

2.1 Performance Criteria

Quantitative criteria to assess the performance of the Walk Trail Dieback Management plan have been developed and are detailed below:

- a) **Number and location of introductions of *Phytophthora* dieback along the coastal walk trails.**

No new introductions would indicate good performance with one or more indicating poor performance. Location in assessing against this criteria needs to be considered as containment within a micro-catchment or between walk trail entry nodes will influence management options.

- b) **Type and area of dieback surveys completed annually.**

The minimum survey required will be ground based survey of the full length of the Mamang and Hakea trails annually during the summer period. Aerial based survey of the Wilderness route is highly desirable annual but subject to resource availability.

- c) **Response time and effective management / containment of any new infestations**

*Closure of either of the trails post detection of a suspected infestation will **occur immediately** with detailed dieback interpretation and sampling within one week of detection. If detection is returned positive then management / containment measures are to be in place within **three months** (to allow sufficient time for interpretation, planning and implementation) with closure periods to be informed by the severity and scale of the infestation.*

2.2 Implementation of the Plan

This plan is to be used by the DPaW Albany District as a tool to guide its works planning and budgeting for the management of the Hakea and Mamang walk trails and the coastal wilderness walking route in the Fitzgerald River National Park.

2.3 Evaluation of the Plan

This Dieback Management Plan will be reviewed annually by DPaW Albany District at the end of the financial year prior to works planning for the next year. The results of this review will be reported annually to the Office of Environmental Protection Authority (OEPA) in the walk trails Compliance Assessment Report, as required by condition 9-4 of Statement 884. The Compliance Assessment Report will be made publicly available within 14 days of submission to the OEPA.

3 BACKGROUND

3.1 Fitzgerald River National Park

The FRNP is the largest 'A' class reserve on the South Coast, encompassing an area of approximately 297,000 ha. The park is situated within the Fitzgerald Biosphere, one of two International Biosphere reserves in Western Australia recognised by the United Nations Educational, Scientific and Cultural Organization (UNESCO). This status was originally conferred in recognition of park's extremely high biodiversity (CALM 1991).

FRNP is one of the richest areas for plants in Western Australia, with over 1700 identified species. About 75 of these are endemic, that is, they are found nowhere else, and some 250 species are either very rare or geographically restricted. The park contains 20% of the State's described flora species (CALM 1991).

The FRNP is divided into four management zones, which provide a framework for the protection of conservation values and the provision of a range of recreation uses. The management zones in the FRNP are Special Conservation, Wilderness, Natural Environment and Recreation. Further information on FRNP is provided in the Park's Management Plan (CALM 1991).

3.2 FRNP Coastal Walk Trails

In 2009 it was proposed to develop a coastal walk trail in the Fitzgerald River National Park as part of a broader project to upgrade roads and recreation sites in the park. This project was referred by DPaW under the *Environment Protection and Biodiversity Conservation Act 1999*. It was determined to be 'not a controlled action if undertaken in a particular manner', which included '*There must be no further spread of dieback to special environmental areas as a result of the development, its associated activities and/or its consequential impacts*'.

From 2010 the former DEC undertook the planning and environmental surveys for a 4 day coastal walk trail from Point Ann to Hamersley Inlet, with overnight facilities at Fitzgerald Inlet, Twin Bays and Quoin Head. This included a concept plan (Ecoscape 2010), flora (Tauss 2012), fauna (Phoenix Environmental Sciences 2011a, 2011b), indigenous (Applied Archaeology Australia 2011, 2012; Goode 2011) and dieback surveys (DEC 2011).

However, the *Fitzgerald River National Park Management Plan 1991-2001* only provided for a coastal walking 'route' through the central Wilderness Management Zone, not a constructed trail. Therefore amendments to the FRNP Management Plan were proposed, including changes to allow for a walk trail from Point Ann to Hamersley Inlet and development of associated overnight facilities for this coastal walk trail.

In considering the amendments to the FRNP Management Plan, the Conservation Commission stated in January 2011 that regarding the dieback management of the proposed coastal walk trail, they had '*grave reservations that promissory commitments to the management of this disease may not be adequate in preventing further introductions and spread of the disease*' (letter to DEC from Conservation Commission, ref: C9, 6 January 2011). The Conservation Commission endorsed the Management Plan amendments subject to additional resources being provided for park management, and the development of a dieback risk assessment and management plan. In response to this, the State Government provided four years of funding for two 'dieback' rangers in the FRNP to assist in the management of the park and the proposed walk trails.

Due to local community concerns regarding the dieback risk of the proposed coastal walk trail, the project was also referred by a third party to the Western Australian Environmental Protection Authority (EPA) in September 2010. From this the EPA advised in May 2011 that it considered the proposal to be '*environmentally unacceptable*', concluding that '*it is highly likely that the proposed walk trail and use of vehicle tracks for maintenance would eventually spread *Phytophthora dieback* into the Wilderness Management Zone of the Fitzgerald River NP, significantly impacting on internationally significant environmental values present in the Park*' (EPA 2011). The EPA recommended that if the walk trail was to go ahead that the proposal should be amended to not go through the Wilderness Management Zone.

In December 2011 the Environment Minister approved the proposed walk trail subject to a number of conditions, including that '*the proponent shall not implement any aspect of the proposal within the Wilderness Management Zone*' (Ministerial Statement 884). The proposed amendments of the FRNP Management Plan, except those that allowed for the walk trail through the Wilderness Management Zone, were gazetted on 30 December 2011.

The coastal walk trail proposal from Point Ann to Hamersley Inlet was therefore amended into two shorter walk trails either side of the Wilderness Management Zone:

- Mamang Trail: Point Ann to Fitzgerald Inlet, approx. 26 km return with a shorter return loop option at Lake Nameless. Fitzgerald Inlet is an overnight camping area with toilet and water provided.
- Hakea Trail: Cave Point to Quoin Head, approx. 50 km return, with a link to Hamersley Inlet day-use area. An overnight facility at Whalebone Beach area includes a shelter, tent pads, toilet and water tank.

There are major trail heads at Point Ann, Hamersley Inlet, and Cave Point. Minor trail signage will be constructed at all other vehicle access points to trail.

No trail will be constructed through the Wilderness Management Zone, but Fitzgerald Inlet to Quoin Head will remain an unmarked wilderness walking 'route'.

3.3 Dieback in FRNP

FRNP is the largest conservation reserve in southwest Western Australia that is currently relatively free of *Phytophthora cinnamomi*, which is considered the most significant threats to the biodiversity of the park. As of February 2013, there are seven small *Phytophthora cinnamomi* infestations identified in the FRNP, the majority of which have been identified in the last two years (Figure 1): Further details of these current infestations are in the FRNP Dieback Protection Plan (DPaW in prep.).

There are six other species of *Phytophthora* that have been identified in the FRNP. The most widespread of these is *Phytophthora megasperma*. Most of these other *Phytophthora* are episodic, causing death of susceptible plants periodically during specific weather conditions, with some having the potential for significant impact. Preventing the spread of these *Phytophthora* species is an important aspect of the management of the park, with *P. cinnamomi* presenting the most significant threat due to the high number of susceptible species.

Another pathogen that causes 'dieback' in the FRNP is *Armillaria luteobubalina*. It is a native fungus that causes root rot in a wide variety of plants, although the susceptibility or tolerance of the flora in the FRNP is poorly known. However there is evidence that it can cause a significant impact on whole plant communities. The distribution of *Armillaria* in the FRNP is unknown. However, there are three patches of *Armillaria* known on/near the walk

trail alignment (Figure 1). As a fungus, *Armillaria* is spread by spores during the fruiting season (May to August) or movement of infected root material.

Another pathogen that causes 'dieback' in the FRNP is native aerial cankers, which appear to be having an increasing impact on FRNP. These cankers are spread by aerially-borne spores.

3.4 Dieback on the FRNP Coastal Walk Trails

The FRNP Coastal Walk Trail alignment was first specifically surveyed for *Phytophthora* by DPaW interpreter Peter Blankendaal in July 2011 via helicopter (DEC 2011). The alignment of the Mamang and Hakea trails were then surveyed prior to construction in late 2012 by interpreters Greg Freebury (Mamang trail) and Malcolm Grant (Hakea trail).

As of February 2013 no *Phytophthora cinnamomi* has been identified on the FRNP coastal walk trail alignments. The majority of the trail alignment is interpretable¹ except the beach sections and the vegetation around Fitzgerald and Hamersley Inlets. There are also patches of *Phytophthora megasperma* on some of the vehicle access routes to the trail (Figure 1).

There are three patches of *Armillaria luteobubalina* on the trail alignment. The objective of management of *Armillaria* for these walk trails is to manage infestations of *Armillaria* to minimise the likelihood of the pathogen being vectored by humans.

3.5 Principles of dieback management

The effectiveness of *Phytophthora* dieback management and prevention is linked to the type and management effectiveness of particular activities. It is therefore useful to define 'principles of dieback management' to better define the management settings.

1. Low risk activities - Introduction of *Phytophthora* dieback primarily occurs through the movement of infestation soil and plant material into an uninfested area. Therefore where hygiene management and protocols can be applied with the highest level of compliance, activities can be considered low risk e.g. Management activities undertaken under an approved hygiene plan during dry soil conditions, management of contractors or emergency rescue team in line with hygiene plans / protocols.
2. Medium risk activities - Public activities (recreation) is managed through interception via education, infrastructure and management presence. These mechanisms aim to encourage compliance with hygiene measures. Even with a high level of resourcing it is not possible to achieve 100% compliance with hygiene management and therefore there is a medium risk of hygiene management not being adequately or effectively applied. This may also apply in the initial stages of emergency situations where action is taken immediately by parties that are unaware of or intolerant of hygiene management.
3. High risk activities – Unauthorised access has occurred in the past by members of the public that wish to access areas that they historically visited for recreational activities such as camping, fishing or motorised access (e.g. motorbikes). In many cases these people are naïve or apathetic towards dieback hygiene management. Unauthorised access was determined to be the greatest contributor to the risk of introduction and spread in the FRNP Walk Trail Bayesian Belief Network Risk Assessment.

¹ Vegetation that is interpretable due to the presence of dieback susceptible indicator species.

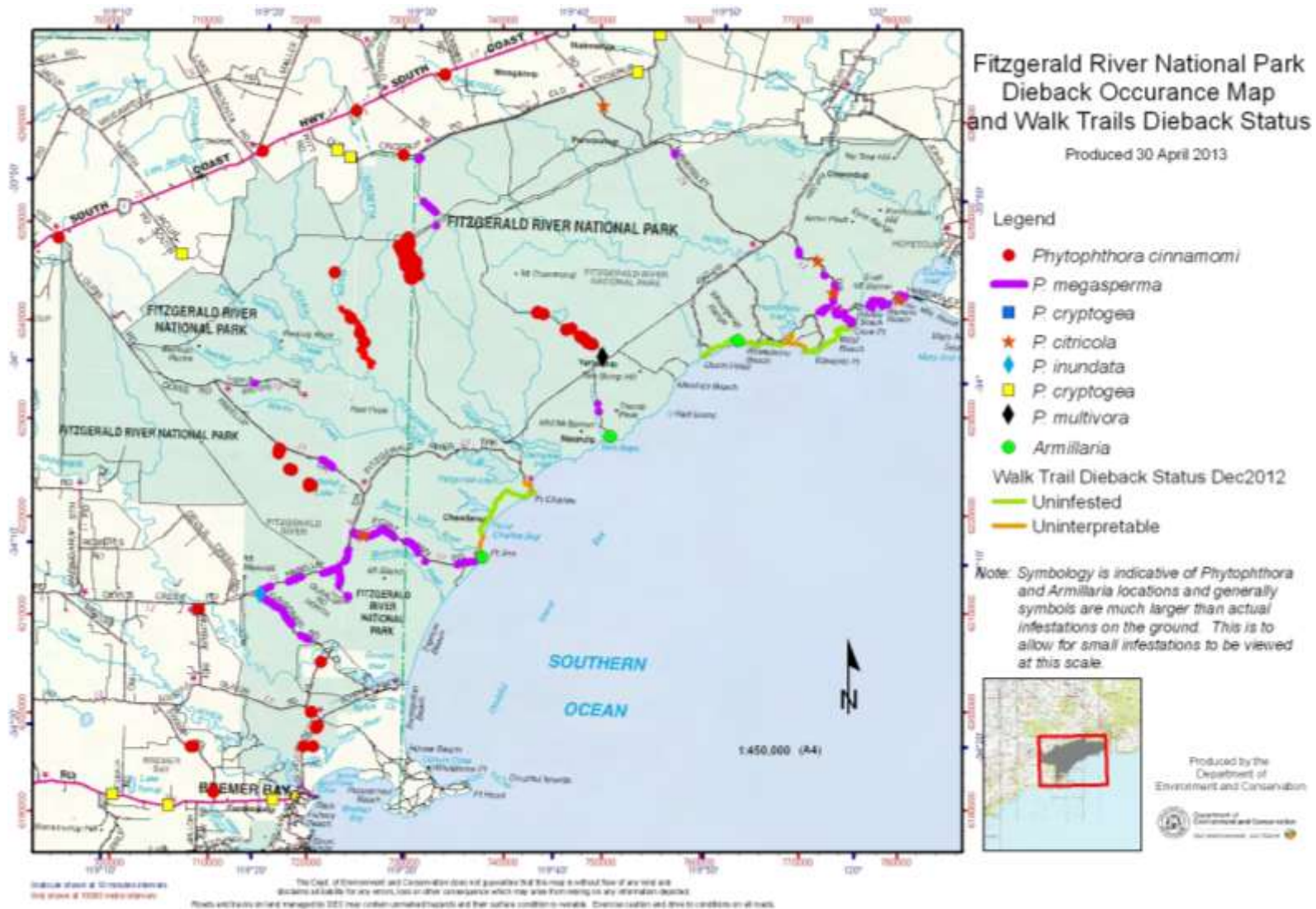


Figure 1: Dieback Occurance Map for the Fitzgerald River National Park and the coastal walk trails.

3.6 Dieback Risk Assessment

An initial environmental risk assessment for the FRNP Coastal Walk Trail was completed in November 2010 by the former DEC South Coast Regional staff, using a standard risk rating based on likelihood and consequence. The risks were assessed for the previous informal route (i.e. status quo) and compared with the risks for the originally proposed walk trail from Point Ann to Hamersley Inlet.

The environmental risks identified included introduction of dieback or weeds, impacts of visitors walking off-trail up the Barren Ranges, taking of rocks and shells, erosion, littering and fire. The risks associated with status quo were Low to Medium, except the risk of dieback which was High. This high risk rating of dieback introduction related primarily to the consequence of dieback introduction being 'Catastrophic²', rather than its likelihood, which was Rare.

It was assessed that the Coastal Walk Trail would introduce additional causes of the risks (e.g. construction activities) and increase the likelihood of some risks, primarily through increasing visitor numbers. The risk of introduction of dieback would still be High but the likelihood increases to Unlikely or Possible. Emergency rescue for walkers was noted as having a high risk due to the possibility of immediate action being undertaken without consultation with DPaW and thus inadequate or absence of hygiene measures during such an exercise. The risk of introduction of weeds and erosion from the use of the walking trail would also be High.

A Bayesian Belief Network model was then used to assess potential management options to minimise the risk of dieback introduction from this originally proposed Coastal Walk Trail. This model was based on expert opinion from those involved in walk trail management and dieback management. The BBN model indicated that there is a high risk of dieback being introduced by use of a FRNP Coastal Walk Trail within the next 20 years with unauthorised access being the greatest contributor to the probability of *Phytophthora introduction*. However, it also showed that management of the trail and dieback infrastructure could significantly decrease this risk, although not remove it.

The BBN model indicated that the most important components of dieback management for the walk trail will be:

- **Hygiene infrastructure**

Dieback hygiene infrastructure, such as boot cleaning stations, decreases the risk of dieback introduction by providing visitors with an opportunity to clean their boots and other equipment, as well as providing a dieback message. However, such dieback hygiene infrastructure should be considered to be a last line of defence and should not be solely relied on. Dieback hygiene infrastructure will need to be situated at all access points to the walk trails.

- **Effective dieback education**

Minimising the risk of dieback introduction to the walk trail relies on the trail users following dieback hygiene protocols and access restrictions. Compliance with such requirements is more likely if the trail users have an appreciation of the biological values of the FRNP, the significant of the dieback risk and how their actions can affect these. Therefore education and awareness of trail users, even before they get to FRNP, is important.

² Catastrophic is a term used in the Risk Register standard and is defined for the purpose of this risk assessment as the introduction of *Phytophthora cinnamomi* relative to other potential environmental impacts.

- **Management presence**

Regular management presence on-site for visitor management, track and infrastructure maintenance and enforcement of dieback hygiene and access restrictions was shown by the BBN model to be an important management requirement for the walk trails. One of the greatest dieback introduction risks for the walk trails is use of the trail by bicycles or trail bikes that have a high likelihood of carrying mud or other potentially infected material on them. Therefore preventing unauthorised use of the trail will be of utmost importance for the trails dieback management.

Historically, the number of rangers and funding for management of FRNP has fluctuated. The BBN model suggest that low levels of trail management increases the risk of dieback due to the reduced ability to ensure compliance with hygiene measures. Therefore it was recommended that the level of management of the trail is closely monitored in order to inform management decisions respective to increasing risk.

The FRNP Management Plan currently prescribes (Section 13 (Access), Prescription 23) to *'monitor annually the status of roads, tracks and footpaths. If erosion gullies become greater than 10cm deep, or if water ponds on a road or track for longer than three or four days after rain, then management action is necessary. These values are based on dieback risk and soil degradation and erosion. They can be re-assessed and new values written if new information indicates the need'*.

Accessing the walk trail for emergencies (medical, missing walker or fire) is potentially a significant risk for dieback introduction. When life is a priority, dieback hygiene protocols can be given a low relative priority or overlooked. This risk can be minimised with pre-planning, preparation, and education and awareness of those that may be involved in emergency situations on how dieback hygiene can be maintained during emergency situations.

- **Closed periods during wet weather conditions**

The BBN model indicated that closing the trail during wet conditions would decrease the risk of dieback being spread, as this risk is greatest during conditions when soil adheres to footwear or tyres.

Further details of this risk assessment are contained in the Walk Trail BBN Dieback Risk Assessment report.

The initial risk rating assessment and BBN model were based on the initially proposed Coastal Walk Trail from Point Ann to Hamersley Inlet. The trail was amended to not go through the Wilderness Management Zone, but it is considered that these risk assessments are still relevant as the change in trail design for the two end trails is minimal and mainly relates to keeping it out of the highest risk area of the Wilderness Management Zone. In both these situations, the formal walk trail and wilderness route, the risks and their management are not altered.

The initial risk rating assessment and BBN model were also completed prior to the March 2012 discovery of an infestation of *Phytophthora cinnamomi* on Drummond Track in the Wilderness Management Zone. Management access into this area has since been closed through permanent ripping of the access tracks, plus the amended walk trail no longer has infrastructure to be serviced by these tracks. Therefore there is not a heightened risk from management access. However, the infestation potentially alters some aspects of the risk ratings. For example, vectoring of *Phytophthora* by animals was considered to be of minimal risk at the time of the risk assessment, but with the Drummond Track infestation, animal vectoring may now need to be considered a significant issue for that infestation being spread further and potentially onto the walk trails.

4 MANAGEMENT ACTIONS

4.1 Actions

The management actions in the following table have been developed to guide and direct the management of and use of the Mamang and Hakea walk trail. Principles for management are aligned with Section 7 “Management of Uninfested ‘Protectable’ Areas” of the *Phytophthora cinnamomi* and disease caused by it – *Management Guidelines* where applicable. If contemporary best practice and/or these guidelines are updated, the management actions contained in this document will be reviewed to ensure continued alignment.

Management Actions	Priority	Time-frame
Walk Trail Management		
1. Vehicle and foot access to the walk trails for management are to follow strict dieback hygiene protocols, including: <ul style="list-style-type: none"> • Access during dry soil conditions only, and • All vehicles, equipment and footwear must be clean prior to (a) entering the park and (b) accessing the coastal walk trails. • All vehicles and personnel to carry mobile hygiene kits and clean down equipment including appropriate volumes of suitable sterilising agent as a precaution to encountering unknown areas of infested soil. 	Very High	Ongoing
2. Regularly maintain the Mamang and Hakea walk trails to maintain good drainage of the trails to minimise wet areas or puddling. Management action should be undertaken as soon as dry soil conditions prevail on areas where water ponds on the track for longer than three or four days after rain.	Very High	Ongoing
3. The Mamang and Hakea walk trails are to be maintained as public foot-access only trails, with physical restrictions to other forms of access (i.e. mountain bikes, motor bikes, quadbikes). Small machinery may be used for management where access is possible and the machinery will not damage the trail tread (as detailed in the trail maintenance plan).	High	Ongoing
4. To minimise movement of soil along the trails by walkers, suitable tread structures or surface treatments (as detailed in the trail maintenance plan) are to be constructed for sections of trail that are identified as areas where trail users are likely to engage conditions of wet, transportable surface material.	High	Ongoing

5. Materials for walk trail maintenance (e.g. rocks, sand, gravel) should preferably be obtained from the surrounding area to the walk trail, within the same catchment. If materials are required to be brought in, the materials must have a very high likelihood of being dieback free, as determined by an Accredited interpreter following the guidelines for the assessment of a basic raw materials pit, defined in the Manual for detecting and mapping Phytophthora dieback disease (Draft) (Procedures for DPaW managed Lands, 2013).	High	Ongoing
6. Maintain vehicle wash-down facilities at each of the ranger stations for use by staff to ensure staff are able to maintain strict hygiene for trail maintenance (as per the FRNP Dieback Protection Plan (draft)).	Very High	Ongoing
7. All park staff are to complete before starting work in the park a South Coast Region Green Card Induction. Then within their first 3 months are to complete additional training in Dieback identification, management and sampling techniques (as per FRNP Dieback Protection Plan (DPaW in prep.)).	High	Ongoing
8. In the event that Phytophthora Dieback is suspected (with a high likelihood) or confirmed on or near* the walk trail, the whole walk trail is to be <u>immediately closed to public access</u> and the Dieback Response Plan implemented (Section 4.2). *near is defined as within 50m downslope or upslope within the catchment that the trail traverses.	Very High	Ongoing
9. If the resources required (i.e. park staff or funding) to adequately manage these walk trails as per this Plan to minimise dieback risk and maintain the integrity of the trails are not available, these walk trails or sections of the trails must be closed to public access until the resources are available.	Very High	Ongoing
Management of Access		
10. Close (using signage at each of the major trail heads) the Mamang and Hakea walk trails during wet soil conditions to minimise soil movement along the trail by walkers.	Medium	Ongoing
11. Install and maintain access restriction 'gates' where required to restrict and discourage access to the trail by unauthorised bicycles, motorbikes, etc.	High	Ongoing
12. Consolidate the 4WD tracks at Edwards Point, Whalebone Beach and Quoin Head during construction of the walk trail to minimise the number of times the trail crosses a vehicle track. These track closures will need to be regularly checked and maintained.	High	2013, Ongoing management
13. The Fitzgerald Inlet track is not to be used for mechanical access to the Mamang trail (unless the track is upgraded to remove the potential dieback risk).	High	Ongoing

14. If access to the walk trails or Wilderness Management Zone is requested for Aboriginal customary activities, include in DPaW's advice information on Dieback risk and discourage the use of vehicles. Refer to FRNP Dieback Protection Plan (draft) for further details.	Very High	Ongoing
15. The gravel access roads to be closed during wet soil conditions (as per FRNP Management Plan).	High	Ongoing
Hygiene Infrastructure		
16. Establish and maintain hygiene infrastructure at <u>all</u> access points to the walk trails (Appendix 1).	Very High	2013, Ongoing management
17. Review the location and level of the hygiene infrastructure annually as part of the review of this Plan.	Very High	Annual
18. Liaise with the Shires and local communities to investigate options for vehicle wash-down facilities for park visitors and implement if possible. Refer to FRNP Dieback Protection Plan (draft) for further details.	Very High	2013-2014
Education and Awareness		
19. All interpretative signage, brochures and other trail information relating to the walk trails must include a dieback awareness message.	Very High	Ongoing
20. Liaise with South Coast NRM and other stakeholders to encourage an on-going dieback education program in the local region around FRNP including (but not limited to) schools, mines, walking and 4WD groups. Refer to FRNP Dieback Protection Plan (draft) for further details.	Very High	Ongoing
21. Liaise with the local indigenous community (e.g. South West Aboriginal Land & Sea Council) regarding usage of the walk trails for Aboriginal customary activities. Emphasise dieback risk and how this can be minimised. Refer to FRNP Dieback Protection Plan (draft) for further details.	Very High	Ongoing
22. Incorporate information on walk trail condition and closures due to weather conditions or dieback risk into established park communication networks	Medium	Ongoing

Dieback Survey and Interpretation		
23. Any suspicious plant deaths noticed in the area of the walk trails are to be sampled for <i>Phytophthora</i> by park staff immediately. All samples should be analysed by the Vegetation Health Service to ensure the results are recorded on the Departmental sample database. The VHS should be consulted regarding the stem sterilisation of roots in order to maximise positive recovery from infested samples in periods where soil moisture is low and not conducive to sample collection.	Very High	Ongoing
24. Annually conduct dieback interpretation surveys of the: <ul style="list-style-type: none"> a. Mamang and Hakea walk trails, b. coastal wilderness route, and c. vehicle access routes used to maintain the walk trails. <p>These surveys are to be completed only by a qualified dieback interpreter (preferably with previous experience with interpreting FRNP vegetation) <u>during periods considered optimal for disease expression</u>.</p> <p>These surveys may be completed as part of a whole park survey (refer to FRNP Dieback Protection Plan (draft) for further details), except the survey of the Mamang and Hakea trails, which must be completed on-ground by walking the trail to ensure small infestations are not missed.</p> <p>Refer to Action 8 if Phytophthora Dieback is suspected (with a high likelihood) or confirmed on or near the walk trail.</p>	Very High	Annual
25. Annually or as new data is obtained, maintain the dieback map and associated GIS data of <i>Phytophthora</i> and <i>Armillaria</i> infestations in the FRNP (as per draft FRNP Dieback Protection Plan).	Medium	Annual
Management of Emergency Access		
26. Develop an Emergency Action Plan for the coastal walk trails which includes dieback hygiene protocols including designated wash-down points and helicopter landing sites. Helicopter access should be the preferred option for emergency access.	Very High	2013
27. Annual planning meetings of DPaW and the local SES, Police and Fire Services to review the Emergency Action Plan to ensure preparedness for emergency situations on the walk trails and a good understanding of the risk of dieback and the biological significance of the area.	High	Annual
Protection of the Wilderness Management Zone		
28. Establish the Wilderness Management Zone as a 'plant disease management area' (section 62(1) of the CALM Act) to provide authority for preventing vehicle access into the area.	Very High	2013

29. Establish the central Peaks (Mid Mt Barren, Woolbernup Hill and Thumb Peak) above 150m contour line as a 'prohibited area' (section 62(1) of the CALM Act) to provide the authority to prevent visitors walking up the Peaks.	Very High	2013
30. Do not promote the wilderness coastal route on FRNP maps and interpretative information.	Medium	Ongoing
31. For wilderness walkers, install interpretative signage and hygiene infrastructure at (a) the northern end of Fitzgerald Beach and (b) Quoin Head (i.e. edge of the Wilderness Management Zone). This signage should include dieback information, the biological significance of the Wilderness and encourage walkers to not walk up the Peaks.	High	2013, ongoing management
Management of current <i>Armillaria</i> infestations		
32. As part of the annual dieback interpretation surveys (Action 24), <i>Armillaria</i> infestations are to be mapped. Any new infestations are to be mapped and all associated GIS databases updated at time of determination.	High	Annual
33. The 4WD tracks in the Whalebone area that have the current <i>Armillaria</i> infestations are to be closed to public access as part of the consolidation of tracks (Action 12).	Very High	2013, ongoing management

4.2 Dieback Response Plan

This Dieback Response Plan details the process that will be required in the event of an infestation of Phytophthora (or any species that causes vegetation dieback) being identified on or near the walk trails. The first step of this response plan should be implemented as soon as an infestation is suspected with a high likelihood and not require waiting for confirmation of the infestation.

The following response steps are to be undertaken:

1. The whole walk trail (Mamang or Hakea) with the infestation is **immediately** closed to all public access (i.e. gates, fencing, signage, management presence, earthworks, public notification).

The whole walk trail, and not just the area of infestation, must be closed until it can be determined whether the Phytophthora infestation has been spread anywhere else along the trail.

2. Investigate the infestation to identify the extent of the problem. This should include as a minimum:
 - detailed mapping and sampling of current extent of the infestation,
 - detailed hydrological modelling of infestation area to determine the catchments and potential extent of spread downslope,
 - assessment of the soil and vegetation to determine susceptibility.
3. Assess potential containment and remedial treatments for the infestation and determine the best treatments for containing the infestation to the smallest area possible. These could include, but are not limited to:
 - Phosphite application for threatened flora species,
 - Preventing animal vectoring by fencing of infestation,
 - Preventing root-to-root spread via root impervious barriers, soil fumigation and/or a vegetation-free buffer zones,
 - Herbicide treatment of the infested area to destroy any potential host plants that could harbour the pathogen, and
 - Fumigation using Metham Sodium.
4. Undertake the containment and remedial treatments. **(steps 2 – 4 to be completed within 3 months)**
5. The walk trail will need to remain closed to access until it can be confidently assessed that there are no other Phytophthora infestations spread along the trail. This would be a minimum of 12 months.
6. Re-route the walk trail away from the infestation, far enough that the infestation could not spread to the walk trail. If this is not possible, the walk trail will need to be closed permanently in that area.

4.2.1 Responsibility and Resourcing of Dieback Response Plan

The initial response (i.e. closing of trail, mapping of extent) to the identification of a Phytophthora infestation will be implemented by the DPaW Albany District. Expertise, both within the Department (i.e. DPaW Science Division) and external (i.e. experts from university or consultancies), will then be needed to assist with the investigation of the infestation and to determine and undertake appropriate containment and remedial actions.

The DPaW Districts initial response as detailed in this Response Plan is estimated to be \$3,650 and approximately 0.07 FTE (further details in Section 4.3). This covers dieback surveys, closure of the trail and initial investigation of the infestation. The cost of containment and control of an infestation would depend on the infestation size, location, soil type and many other factors, but is most likely to be a significant cost and require long term commitment of resources.

4.3 Costing

The cost (as per 2013 pricing) of implementation of this Management Plan has been estimated as detailed below. Only the primary actions and those that are not otherwise covered under the operation of the park have been included in this estimate. This estimate is only an estimate as there are many unknowns (i.e. walker usage, erosion rates, etc.) which would affect the amount of maintenance the walk trail is going to require. This estimate should be reviewed within the first two years of operation of the trail for a better estimate.

The total annual resource requirement for dieback management and maintenance of the walk trail is estimated to be 0.97 FTE and \$26,000.

Management Action	Item Costs #	Staff FTE (\$*)	Costs (Annual)
Walk Trail Management			
Routine trail management	Avg. 1 day FTE and 100km vehicle travel per week	0.25 FTE (\$16,068)	\$6,420
Vegetation and tread maintenance (twice a year)	Mamang: 18 days hand work, 5 days machine Hakea: 36 days hand work, 10 days machine	0.66 FTE (\$42,418)	\$3,638
Dieback Surveys			
Mamang and Hakea Trails	4 days survey plus 4 days travel	0.04 FTE (\$3,881)	\$3,000
Access routes	7 days survey	0.02 FTE (\$1,941)	\$3,000
Wilderness Route	4 hours helicopter		\$6,400
TOTAL ANNUAL COSTS		0.97 FTE (\$64,308)	\$26,095
Initial Costs (one-off)			
Boot cleaning stations and dieback signage installation	\$5,000/station; \$200/cleaning location signage	0.07 FTE (\$6,792)	\$35,000
Development of Emergency Action Plan	3 weeks FTE 3 FRNP consultation trips	0.07 FTE (\$6,792)	\$2,295
Complete FRNP Dieback Protection Plan	3 months FTE	0.25 FTE (\$24,259)	-
TOTAL		0.44 (\$37,843)	\$37,295
INITIAL DIEBACK RESPONSE			
	Initial response (closure of trail, detailed survey and mapping)	0.07 FTE (\$6,792)	\$3,650

Vehicle costs calculated at \$0.85/km.

* Staff costs are estimated using 2012/13 rates for a Ranger Grade 2 for ranger activities (i.e. maintenance) and a Level 5 staff member for other activities (i.e. dieback surveys).

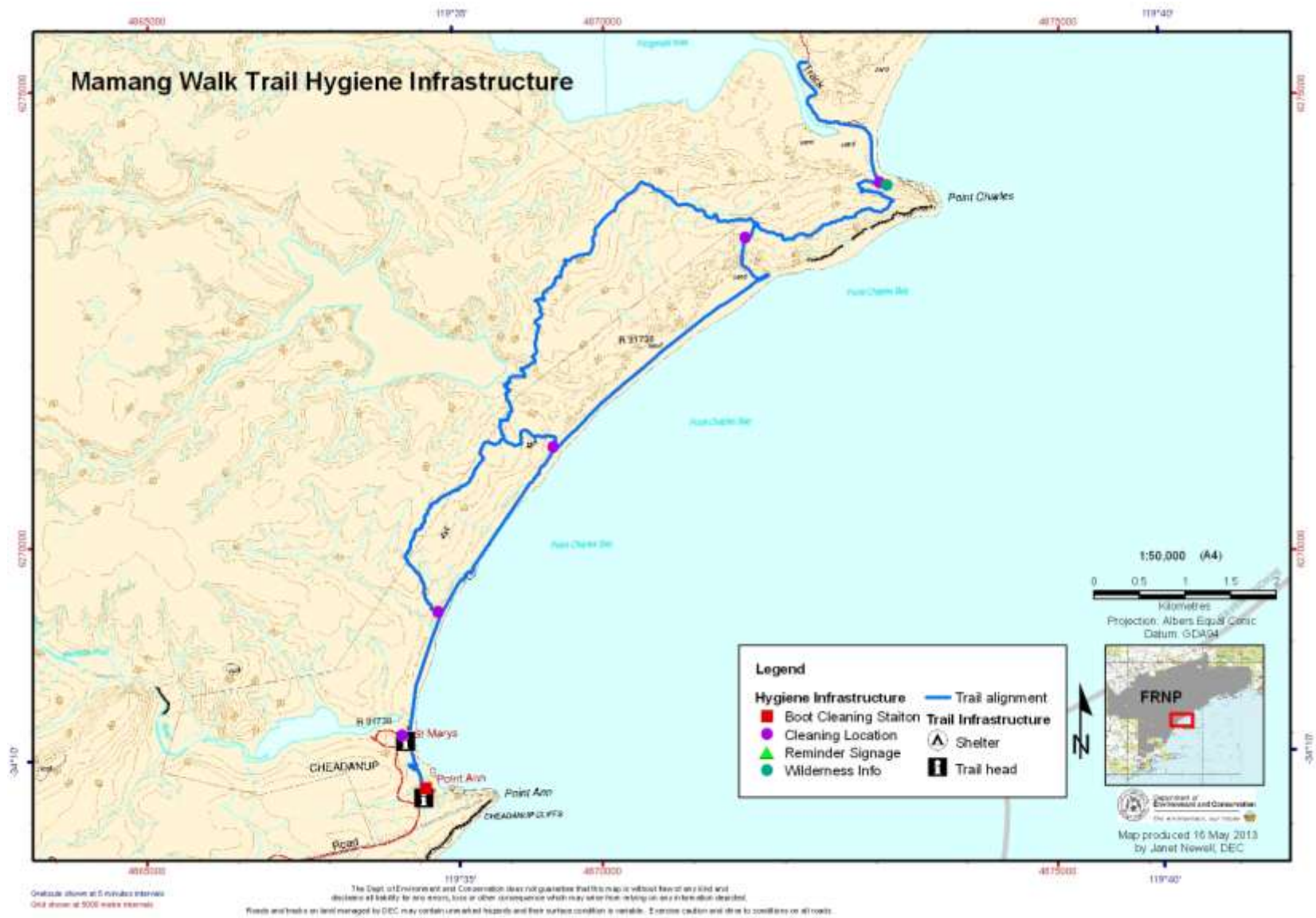
APPENDIX 1: Hygiene Infrastructure

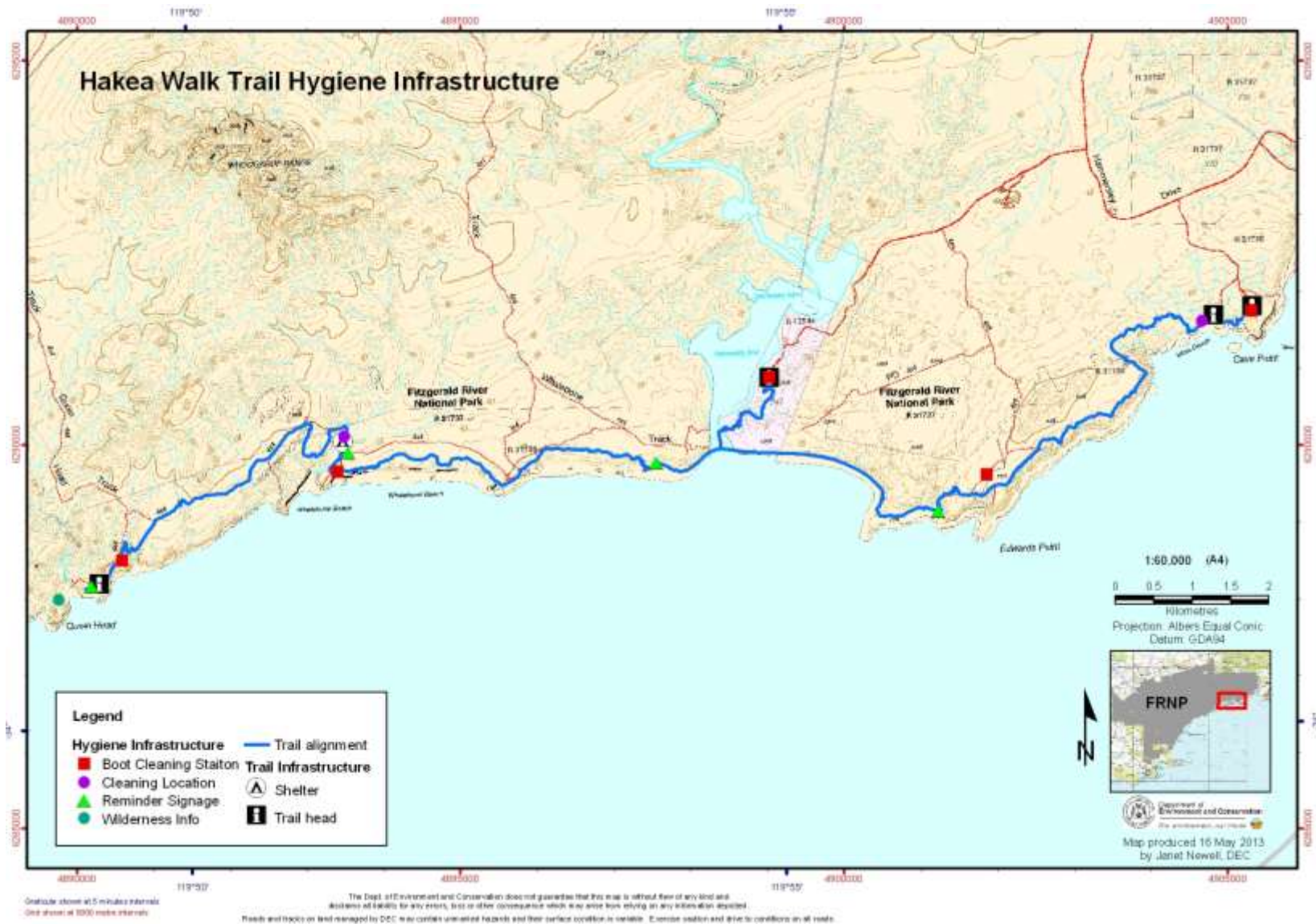
Dieback hygiene infrastructure needs to be situated at all access points to the walk trails (Action 16). A number of factors were considered when deciding what and where dieback infrastructure should be installed. These include: visitor usage of the location, susceptibility of the vegetation in the location, location of beaches, management requirements of the infrastructure, management access to the location, and the location of other hygiene infrastructure.

Three options of dieback hygiene infrastructure have been considered for the access points to the walk trails:

- **Boot cleaning station:** boot scrubber with collecting trough, including interpretative signage. The advantage is that it contains the waste, however needs relatively regular maintenance to ensure the boot scrubber doesn't get clogged up with mud and the collecting trough doesn't overflow.
- **Cleaning location:** basic dieback hygiene signage with a brush and/or boot pick as a 'clean down' site over a hardened surface. As the waste isn't contained this is only suitable for an area that is not dieback susceptible downstream (such as foredunes), but has the advantage that it would not require regular maintenance.
- **Reminder Signage:** Reminder signage, without hygiene infrastructure, at suitable locations to remind walkers of the dieback risk, ask them to ensure gear is clean and inform them where the nearest hygiene infrastructure is. This would rely on the walkers being able to clean boots etc. themselves.

The locations of the hygiene infrastructure installed in 2013 are shown on the below maps. This should be reviewed annually and modified if required (Action 17).





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