



Phytophthora Dieback Assessment of Shire of Mundaring

Priority Bushland Reserves

Prepared for Shire of Mundaring

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& management**

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Abbreviations and Acronyms

BoM	Bureau of Meteorology
CPSM	Centre for Phytophthora Science and Management
DBCA	Department of Biodiversity, Conservation and Attractions, WA Government
DEC	former Department of Environment and Conservation (now DBCA), WA Government
DIDMS	Dieback Information Data Management System
Dieback Interpreter's Manual	<i>FEM047 Phytophthora Dieback Interpreter's Manual for lands managed by the Department</i>
DPaW	former Department of Parks and Wildlife (now Parks and Wildlife Service, part of DBCA/ former DEC), WA Government
DPIRD	Department of Primary Industries and Regional Development, WA Government
EPA	Environmental Protection Authority, WA Government
FEMD	Forest and Ecosystem Management Division of DBCA, WA Government
GDA94	Geocentric Datum Australia 1994
IBRA	Interim Biogeographic Regionalisation for Australia
ISD	Indicator Species Death
VHS	Vegetation Health Services laboratory at DBCA, WA Government

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Executive Summary

In November 2017, the Shire of Mundaring (the Shire) commissioned Terratree Pty Ltd to undertake a Comprehensive Ecological Assessment of 54 high priority nature reserves in the Shire (*Priority Reserves Ecological Assessment Report 2018*, Terratree Pty Ltd, 2018). The objective of the assessment was to collect a broad spatial dataset for selected variables to inform planning and target resources for environmental management across the reserves network within the Shire. The assessment collected desktop and field data on variables including significant trees, weeds, *Phytophthora Dieback* (Dieback) infestation, feral animals, rubbish dumping, Dieback signage and tracks and vehicle access.

The Comprehensive Ecological Assessment indicated that Dieback is likely having a significant impact on species diversity and ecosystem function within most of the reserves assessed. A key recommendation of the assessment report was to conduct a Comprehensive Dieback Assessment of those reserves identified as having areas potentially protectable from Dieback infestation. The report also recommended protectable areas should be assessed for access restrictions, Dieback signage and treated as environmentally sensitive areas requiring greater Dieback hygiene practices from the Shire, contractors and the community.

In 2019, the Shire of Mundaring commissioned Terratree to undertake a comprehensive Dieback assessment of 33 bushland reserves identified by the Comprehensive Ecological Assessment as having areas potentially protectable from Dieback. The objective of the Comprehensive Dieback Assessment was to confirm and map the extent of Dieback infestation within each reserve; and, to confirm protectable areas within these reserves.

The specific outcomes of the Comprehensive Dieback Assessment include:

- Complete comprehensive Dieback mapping of the 33 of identified bushland reserves suitable for addition to Shire GIS.
- Confirm Protectable areas within these reserves (i.e. Dieback free areas that may be protected from Dieback infestation in the long term).
- Recommend Dieback signage locations within reserves with protectable areas to assist in reducing the introduction of Dieback.
- Identify reserves suitable for establishing 10 rehabilitation plots trialling native plant species resistant or that have a low susceptibility to Dieback. This information will assist to inform the project 'Dieback Mapping and Rehabilitation in the Shire of Mundaring (a 3-year project funded by the State Natural Resource Management (NRM) Program and supported by Murdoch University).

The Comprehensive Dieback Assessment area covered approximately 762 hectares (ha) (within the 33 reserves) in the Shire of Mundaring. The assessment was undertaken in stages:

- A desktop review of relevant information regarding site characteristics plus previous Dieback mapping and sampling results.
- Field assessment to observe Dieback disease symptoms, record Dieback occurrence category data, and collect soil and tissue samples for diagnostic testing.
- Field assessment to identify suitable locations for installing Standard Protocol Dieback Signage within the reserves.
- Field assessment to identify reserves suitable for establishing 10 rehabilitation plots trialling native species that are resistant or have a low susceptibility to Dieback.

The field assessments were undertaken by a DBCA registered Dieback Interpreter and Trainee Interpreters from Terratree between 9 April and 2 August 2019. The assessments were conducted according to the FEM047 *Phytophthora Dieback Interpreter's Manual* for lands managed by the Department produced by the Forest and Ecosystem Management Division (FEMD 2015; hereafter referred to as 'the Dieback Interpreter's Manual').

Dieback was found to be widespread in the lower slopes, along drainage lines and water-gaining sites in many reserves. Infestations were also frequently mapped along access tracks, trails, firebreaks, old gravel pits and disturbed areas within the reserves.

A total of 73 soil and tissue samples were collected from 31 of the reserves and sent to the Vegetation Health Services (VHS) Laboratory for diagnostic baiting analysis. The analysis confirmed 42 positive results for *Phytophthora cinnamomi* and one sample returned a positive result for another species of Dieback, *Phytophthora multivora*. After receiving unexpected negative results, 16 samples were retested. Retesting confirmed six of these samples as positive for *P. cinnamomi*.

Three reserves, Marriott Park, Cookes Brook and Milligan Road Reserve, were deemed uninterpretable due to a lack of Dieback susceptible species and the degraded condition of the vegetation. However, the one sample obtained from Cookes Brook reserve returned a positive result indicating the presence of Dieback in this reserve. Therefore, the presence of Dieback was confirmed in 31 of the 33 reserves assessed.

Established protocols were applied in determining reserves with Uninfested areas that are protectable from Dieback. Uninfested areas in three reserves were mapped as Unprotectable from dieback infestation due to their very small size (<0.5ha) or other factors such as landscape position. Twenty-six (26) reserves had Uninfested areas which were potentially protectable.

A total of nine reserves were identified as having Uninfested areas which meet protectability criteria to be Protectable from Dieback infestation in the long-term to very long-term (50 to over 100 years). These are:

- Alps Street Reserve
- Pindalup Reserve
- Superblock inc prev. Wildflower Seed Reserve
- Quail Street Reserve
- Strettle Road Reserve
- Hovea Conservation Park
- Mathieson Road Transfer Station
- Falls Road Reserve
- North Darlington Reserve

A further six had uninfested areas which were determined to be protectable in the medium-term (20 to 50 years). These are:

- Railway Reserve Hovea - Chidlow
- Black Cockatoo Reserves South
- Binbrook Park
- Black Cockatoo Reserves North
- Southern Railway Heritage Trail Boya- Mundaring
- Cameron Road Reserve

Uninfested areas in the seven other reserves assessed were considered protectable only in the short-term (less than 20 years) and are therefore deemed Unprotectable from Dieback Infestation. However, protectability status should be reviewed on a case by case basis and some areas smaller may be appropriate for protection for other reasons (e.g. socio-economic, ecological values).

Recommendations for reserves with areas identified as protectable from Dieback include:

- Treatment: Treat buffer at the interface of Infested¹ and Uninfested Protectable areas with phosphite.

¹ Dieback occurrence categories (infested, uninfested, uninterpretable etc.) within the report are used with reference to the criteria for each category in **Table 2**.

- Monitoring: Establish annual photo monitoring points for areas treated with phosphite.
- Access Management: Review and update management protocols for vehicle and machinery access to the reserves.
- Signage: Review Dieback signage in the reserves to ensure they are correctly placed and adequate.
- Flora Survey: Undertake baseline flora surveys to quantify species richness and cover along transects through Infested to Uninfested areas in different soil and vegetation types in priority reserves to inform species selection for rehabilitation trials.
- Rehabilitation Trials: Establish rehabilitation trial plots in different soil and vegetation types.
- Revegetation: Revegetate Excluded (Degraded) areas with resistant species or species that have low susceptibility to *P. cinnamomi* infection.

Reserves where uninfested areas which are considered unprotectable, revegetating infested and degraded areas with Dieback resistant and low susceptibility species is recommended. Revegetating areas that are infested or degraded will have a number of benefits including restoration of ecological function, reduce weed invasion, reduce soil erosion, improvement of visual amenity and assist Friends groups to be more effective in undertaking conservation works.

A desktop study was undertaken to determine which reserves would be suitable for establishing rehabilitation trial plots. Sites were selected based on several criteria including having a representative number of reserves (with and without Dieback infestations) in dominant soil and vegetation types in the Shire.

The following 10 reserves were identified as suitable locations to conduct rehabilitation trials using native species that are resistant or have low susceptibility to *P. cinnamomi*:

- Alps Street Reserve
- Superblock (including previous Wildflower Reserve)
- Quail Street Reserve
- Strettle Road Reserve
- Hovea Conservation Park
- Falls Road Reserve
- North Darlington Reserve
- Black Cockatoo Reserve (south)
- Binbrook Reserve
- Callan Road Reserve

Prior to conducting rehabilitation trials, baseline flora surveys should be conducted across disease fronts in different soil and vegetation types to determine appropriate species to use in the trials. Surveys can help determine the most suitable species for use in rehabilitating infested and degraded areas within the reserves where this is recommended.

Dieback signage was outdated, vandalised or absent in 18 of the 33 reserves assessed. In some cases where Standard Protocol Dieback Signage was present, it was incorrectly located. Standard Protocol Dieback Signage should be installed in priority protectable areas to inform reserve users of the risk of spreading Dieback and protocols for minimising spread, particularly during wet soil conditions. This is especially relevant to hikers, mountain bikers and horse riders. Vehicular access is a major vector of Dieback spread and this problem is compounded in reserves with inadequate signage. Firebreak maintenance activities requiring ground disturbance should also be planned so as to minimise the spread of Dieback.

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1 Introduction

1.1 Background

In November 2017 the Shire of Mundaring (the Shire) commissioned Terratree Pty Ltd to undertake a Comprehensive Ecological Assessment of 54 high priority nature reserves in the Shire (*Priority Reserves Ecological Assessment Report 2018*, Terratree Pty Ltd, 2018). The objective of the assessment was to collect a broad spatial dataset for selected variables to inform planning and target resources for environmental management across the reserves network within the Shire. The assessment collected desktop and field data on variables including significant trees, weeds, Phytophthora Dieback (Dieback) infestation, feral animals, rubbish dumping, Dieback signage and tracks and vehicle access.

Amongst other important findings, the Comprehensive Ecological Assessment indicated that Dieback is likely having a very significant impact on species diversity and ecosystem function within most of the reserves assessed. A key recommendation of the assessment report was to conduct a Comprehensive Dieback Assessment of those reserves identified as having areas potentially protectable from Dieback infestation. The report also recommended protectable areas should be assessed for access restrictions, Dieback signage and treated as environmentally sensitive areas requiring greater Dieback hygiene practices from the Shire, contractors and the community.

In 2019, the Shire of Mundaring commissioned Terratree to undertake a comprehensive Dieback assessment of 33 bushland reserves identified by the Comprehensive Ecological Assessment as having areas potentially protectable from Dieback. The objective of the Comprehensive Dieback Assessment was to confirm and map the extent of Dieback infestation within each reserve; and, to confirm protectable areas within these reserves.

The specific outcomes of the Comprehensive Dieback Assessment include:

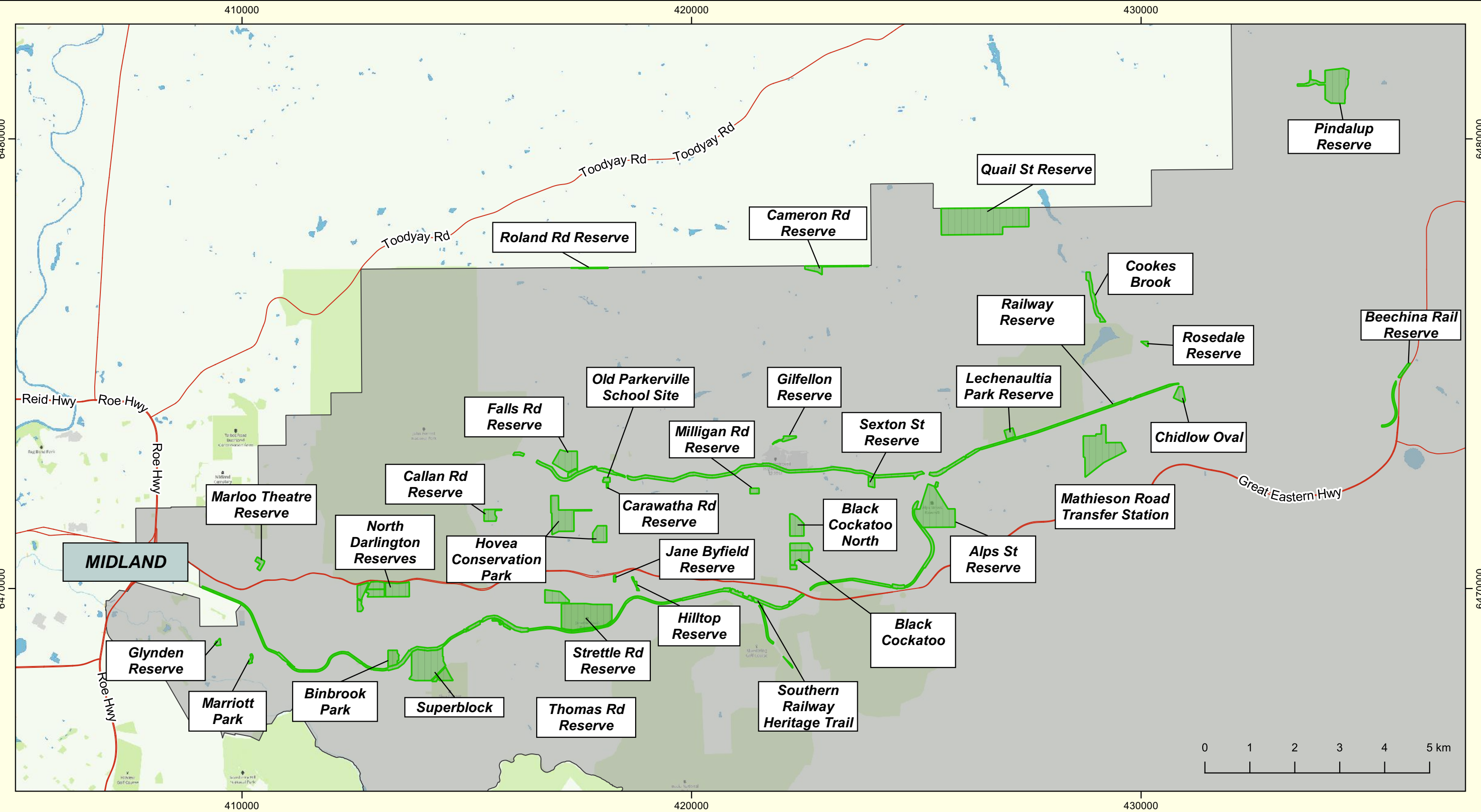
- Complete comprehensive Dieback mapping of the 33 of identified bushland reserves suitable for addition to Shire GIS
- Confirm Protectable areas within these reserves (i.e. Dieback free areas that may be protected from Dieback infestation in the long term)
- Recommend Dieback signage locations within reserves with protectable areas to assist in reducing the introduction of Dieback
- Identify reserves suitable for establishing 10 rehabilitation plots trialling native plant species resistant or that have a low susceptibility to Dieback. This information will assist to inform the project 'Dieback Mapping and Rehabilitation in the Shire of Mundaring' (a 3-year project funded by the State Natural Resource Management (NRM) Program and supported by Murdoch University).

1.2 Project Location and Size

The Shire of Mundaring Local Government Area (LGA) is located east of Perth, Western Australia, encompassing areas of the Darling Scarp and Northern Jarrah forest (**Figure A**). The project area covers 33 priority bushland reserves within the LGA boundary (hereafter referred to as 'the assessment area'). The reserves lie north and south of the Great Eastern Highway near the townships of Boya, Greenmount, Helena Valley, Darlington, Glen Forrest, Mahogany Creek, Mundaring, Hovea, Parkerville, Stoneville, Mount Helena, Chidlow and Wooroloo.

The assessment area is 761.7ha in total area. Individual reserve sizes are detailed in **Appendix B**.

Figure A: Project location map



Legend

- Reserves Assessed
- Shire of Mundaring Local Government Area

Road Network

- State Road

Project Location

Project Location Map

2019 Shire of Mundaring Reserves Assessment

Datum: GDA 1994
Projection: MGA Zone 50

Scale: 1:125,000
at A3

Date: 28/08/2019	Prepared: G. Maslen	Project #: T19011
Expiry: N/A	Checked: G. Maslen	
Figure 1	Review: J. Grehan	
	Revision:	

1.3 Phytophthora Dieback

Phytophthora Dieback ('Dieback') is a disease caused by the introduced soil-borne pathogen *Phytophthora cinnamomi*. While some plant species are resistant, others are susceptible to the disease caused by the pathogen, which can result in chlorosis, decline and usually death (Wills and Keighery 1994). The pathogen has a range of plant hosts in Southwest WA, predominantly from the Ericaceae, Fabaceae, Myrtaceae, Proteaceae, and Xanthorrhoeaceae families.

Although several *Phytophthora* species occur in Western Australia, the most virulent and pathogenic is *P. cinnamomi*. References to Phytophthora Dieback refer to the disease caused by this species unless otherwise specified. Other species of *Phytophthora* found in W.A., such as *P. multivora*, are less virulent, and significantly less widespread than *P. cinnamomi*.

The most recent Western Australian State of the Environment Report lists Dieback as a Priority 1 threat to biodiversity (EPA 2007). A recent review of threats to species listed as threatened under the Federal *Environment Protection and Biodiversity Conservation Act 1999* shows that *P. cinnamomi* is the second greatest invasive species threat in Australia after rabbits (Kearney *et al.* 2019).

Dieback has a significant effect in WA for the following reasons:

- 40% of native plant species in Southwest WA (over 2,200 species), including almost half the endangered species (Shearer *et al.* 2004) and threatened flora² (EPA 2007), are susceptible to the pathogen
- Changes in the composition and structure of floral communities resulting from the spread of Dieback have flow-on impacts throughout the ecosystem, including habitat alteration that can negatively affect indigenous fauna populations
- Dieback can lead to significant soil erosion through the loss of susceptible vegetation.

Disease expression caused by *Phytophthora* species occurs in native vegetation when the following variables and environmental conditions are present:

- Host - plant species are present that are susceptible to *Phytophthora* spp. (i.e. *Banksia*, *Hakea*, *Leucopogon* and *Daviesia* spp.)
- Pathogen - a *Phytophthora* spp. pathogen must be present, either residing in susceptible or resistant species
- Environment - soil temperatures of 15-30 °C and pH 5-6 (acidic) are required for *P. cinnamomi* survival and activity. Some *Phytophthora* species, including *P. multivora*, can survive in alkaline soils (pH 7+).

Dieback is widespread in areas with greater than 800 mm of annual rainfall, less extensive in areas that receive between 600 and 800 mm, and mainly restricted to water-gaining sites in areas that receive 400–600 mm. The pathogen rarely occurs in areas receiving less than 400 mm annual rainfall. In WA, Dieback is a significant environmental issue for natural areas between Geraldton in the Midwest and Esperance on the South Coast, and it is widespread in the Southwest region.

Dieback is spread through the movement of water and soil within the landscape. Major vectors of Dieback include, but are not limited to, wet soil adhering to vehicle tyres/tracks and earthmoving equipment. Therefore, access restrictions and quarantine management procedures can be effective tools in reducing the spread of Dieback.

² Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2018* (Department of Biodiversity, Conservation and Attractions)

1.4 Regulatory Context

Phytophthora Dieback management is required under several regulatory mechanisms including:

- The Federal *Environment Protection and Biodiversity Conservation Act 1999*, which lists Phytophthora Dieback as a Key Threatening Process.
- Development projects being assessed under the Western Australian *Environmental Protection Act 1986*, which requires the Department of Biodiversity, Conservation and Attractions (DBCA) and/or Department of Mines, Industry Regulation and Safety to comment on Dieback management and provides these agencies with the right to impose conditions on new approvals.
- The *Environmental Protection Act 1986* Part V S.50A “Serious Environmental Harm” provisions.

2 Existing Environment

2.1 Biogeography

The Interim Biogeographic Regionalisation for Australia has defined 89 bioregions and 419 subregions across Australia, based on climate, geology, landforms, native vegetation and species (Department of the Environment 2014). These provide a useful method for reporting biodiversity patterns and categorising assessment areas. The assessment area is located within the Northern Jarrah Forest (JAF01) IBRA subregion.

A biodiversity audit of Western Australia's subregions classified this subregion as follows:

Northern Jarrah Forest (JF1): A duricrust plateau of the Yilgarn Craton with laterite gravels supporting Jarrah-Marri forest in the west and Bullich and Blackbutt in valleys, becoming Wandoo-Marri woodlands in the east on clayey soils with breakaways supporting Powderbark in a warm Mediterranean climate. There are also Agonis shrublands on eluvial and alluvial deposits, Jarrah forest mosaics with species-rich shrublands on Mesozoic sediments, localised sand sheets supporting Banksia low woodlands, and heath on granite rocks and in forest and woodland understoreys in the north and east (Williams and Mitchell 2002).

A large proportion (around 69%) of the Shire is uncleared, with over half of the Shire comprised of National Parks, Nature Reserves or Regional Parks, State Forest or Water Catchment land. Urban development in the Shire comprises residential suburbs on the Swan Coastal Plain and, in the hills, a series of discreet villages separated by rural buffers. Rural residential and rural land use takes up most of the balance of the Shire, particularly in the north and north-east (Shire of Mundaring Local Planning Strategy Background Document).

2.2 Regional Vegetation

The assessment area lies in the Dale Botanical Subdistrict within the Northern Jarrah Forest Subregion (Beard 1990). This subdistrict is characterised by Jarrah (*Eucalyptus marginata*) forest on ironstone gravels plus Marri (*Corymbia calophylla*) and Wandoo (*Eucalyptus wandoo*) woodlands on loamy soils.

Detailed vegetation complexes were mapped within the Darling Scarp and Plateau by Mattiske and Havel (1998) as part of the Regional Forest Agreement process. Eight vegetation complexes are found within the assessment area using this mapping. Characteristics and key locations of these vegetation complexes are listed in **Appendix A** in order of dominance within the assessment area.

2.3 Soils

The assessment areas are all found on the north-western side of the Darling Plateau within Western Australia. The landforms of the assessed reserves are broadly encompassed within the Western Darling Range Zone, described as "a moderately dissected lateritic plateau on granite with deeply incised valleys; includes the Darling Scarp on the western margin" (Purdie *et al.* 2004).

The westernmost reserves (Glynden Reserve, Marloo Theatre Reserve, Marriott Park and part of the Southern Railway Heritage Trail) also fall within the Pinjarra Zone. This is described as "alluvial deposits (early Pleistocene to Recent) between the Bassendean Dunes Zone and the Darling Scarp, colluvial and shelf deposits adjacent to the Darling Scarp. Clayey to sandy alluvial soils with wet areas."

The main features of the Darling Plateau are described by McArthur (1988) as a "generally undulating surface, dominated by gravelly and sandy soils with some ferruginous duricrust, and associated broad, shallow minor valleys with swampy floors". Across the Plateau, the soil pattern is described as "very gravelly, often 60-80 %

gravel, over a clay subsoil” on the slopes, changing downslope to become “deeper, less gravelly and with finer gravels” (McArthur 1988).

The soils within the assessment area are best described as Dwellingup soils using the reference soils in McArthur (1988). These are sandy and gravelly yellow earths, found from broad upland depressions through to mid-slope and lower-middle slope positions. These soils are typically well-drained, and the pH is stable, between 5.9 and 6.4 throughout the soil profile, which is optimal for the persistence of *Phytophthora cinnamomi*.

Expression of disease symptoms in vegetation located on these soils is often good, with disease symptoms only becoming cryptic in areas of variable drainage such as granite outcrop areas or in areas of deep sands. Transmission of the disease in these areas is more reliant on root-to-root contact than throughout the soil profile as the granite can act as a physical barrier to transmission and this results in a range of indicator species persisting in areas infested with *P. cinnamomi*.

2.4 Climate

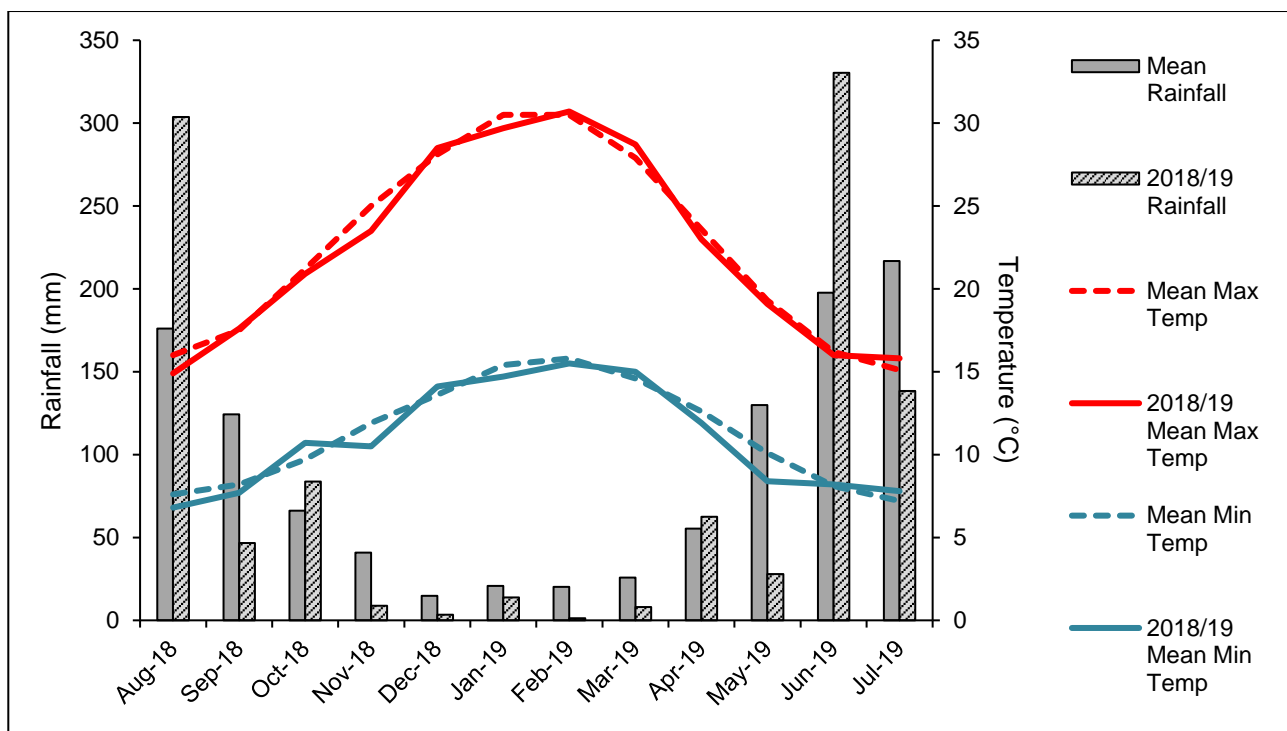
The assessment area lies within the Temperate Dry Summer Hot Summer (Csa) category as classified by Peel *et al.* (2007) and within the Temperate ‘distinctly dry (and hot) summer’ category as classified by the Bureau of Meteorology (BoM 2019a).

The bioclimate classification shown in Beard (1990) places the assessment area within the 3b Dry Mediterranean (5-6 dry months) category. This category closely mirrors the eastern boundary of the Dale Botanical Subdistrict, noted as having a climate “somewhat drier than the Southern Jarrah Forest”, which has 600-1200 mm winter rainfall.

Temperature and rainfall data from weather station Bickley #9240 are shown in **Graph 1**. Mean annual rainfall is 1088.3 mm, placing the assessment area within the high-rainfall zone (800-1400 mm annual rainfall) classified by Hopper (1979). Most rainfall occurs between May and September. Total rainfall recorded for the 12 months prior to and including the Dieback assessment was 1028.4 mm, almost 60 mm below the mean annual rainfall for the area. August 2018 rainfall was well above average records. May and July 2018 rainfall was also above average (151.6 mm and 271.8 mm, respectively). Rainfall from September 2018 through to March 2019 was below average, while October recorded above average rainfall. Above average rainfall was also recorded in April and June 2019, while May and July 2019 rainfall was below average.

Mean maximum temperatures were close to long-term means, with August and November 2018 recording over 1 °C below mean values during the 12 months preceding the survey (1 °C and 1.5 °C below, respectively). Monthly mean minimum temperatures were close to long-term records with some fluctuations above and below the monthly mean. Mean minimum temperatures for October and November 2018 were above mean values for these months (1 °C and 1.4 °C above, respectively), while May 2019 was 1.8 °C below average.

Increased rainfall in winter 2018 may have increased the expression and spread of Dieback within the assessment area since the 2017-2018 Dieback assessment. The dry spring through to autumn since then may have increased plant deaths due to drought, which can complicate interpretation for Dieback. Climate was not considered a limitation to the survey.



Graph 1. Rainfall and temperature data for Bickley weather station #9240 (BoM 2019b).

2.5 Historical Land Use and Disturbance

The Perth Hills area has been historically subject to agriculture, forestry, plus gravel, clay and other resource extraction. Significant areas are still used for agriculture, forestry and water catchments. Rural, rural-residential and residential land use occurs across most of the Perth Hills.

Steep topography and waterways have constrained development in much of the Perth Hills, allowing significant areas to be retained for nature conservation. The Shire of Mundaring Local Biodiversity Strategy (Ironbark Environmental and Eco Logical Australia 2009) states that 44,350 ha of native vegetation (or 69 % of land) exists within the Shire boundary. Of this, 11,950 ha is protected as either National Parks, Regional Parks or Nature Reserves. The remainder includes areas of State Forest, Bush Forever sites, proclaimed water catchments (23,225 ha) or Local Natural Areas (LNAs; 9,175 ha).

Local Natural Areas (LNAs) within the Shire's boundary are either privately owned or under management by the Shire, distinct from conservation estate. LNAs are delineated in the Local Planning Scheme No.4 and are identified for either conservation, protection, or retention. Key threats to LNAs are subdivisions and developments leading to vegetation clearing and fragmentation, weed and feral animal invasion, Phytophthora Dieback and climate change (Ironbark Environmental and Eco Logical Australia 2009).

Fire history of the reserves was not assessed as part of this study; however, evidence of recent burning was observed in many reserves from controlled hazard reduction burns or other reasons.

3 Methods

3.1 Comprehensive Dieback Assessment

The Dieback Interpreter's Manual requires a Comprehensive Dieback assessment be repeated every three years, where ground disturbance activities are planned (FEMD 2015). Recheck assessments involving checking whether the Infested area boundary has spread can be completed annually for up to three years to update Dieback occurrence maps. While this only applies to DBCA-managed lands, it is best practice, and Terratree recommends that all land managers follow this guidance where ground disturbance activities (e.g. firebreak construction, trail construction, drainage works) are planned in areas of native vegetation, particularly in areas where infestations are known to occur.

3.2 Desktop Assessment

A desktop assessment was completed to collect information about the assessment area, surrounding landscape and previous history of *Phytophthora* Dieback surveys.

The Dieback Information Data Management System (DIDMS) was used to obtain data from the Vegetation Health Services (VHS) laboratory on Dieback occurrence mapping and sample results from previous assessments in the area.

The desktop assessment also aimed to:

- identify access to the assessment area and internal tracks
- examine topography and drainage of the assessment area and broader landscape
- identify possible disease vectors (e.g. tracks, utility corridors and ground disturbance)
- determine the location of high-risk areas (e.g. areas of high disturbance and water-gaining sites)
- review previous reports and other relevant literature.

3.3 Field Assessment

3.3.1 Survey Strategy

Field assessment requires visually assessing native vegetation within the assessment area, recording Dieback occurrence category data, and collecting soil and tissue samples from recently dead (within the previous six months) disease indicator species for diagnostic testing. The age of a plant's death is determined through experience and generally will relate to the degree to which the plant has decomposed.

The Comprehensive Dieback field assessment was conducted between 9 April and 2 August 2019 and was completed by Terratree Director and DBCA-registered Dieback Interpreter Joseph Grehan, assisted by Terratree Trainee Interpreters Glenn Maslen and Tamara Kabat.

The assessment was conducted according to the *FEM047 Phytophthora Dieback Interpreter's Manual for lands managed by the Department produced by the Forest and Ecosystem Management Division* (FEMD 2015; hereafter referred to as 'the Dieback Interpreter's Manual').

Spatial data, including disease evidence points and sample locations and photographs, were recorded using handheld Global Positioning Satellite (GPS) units.

3.3.2 Assessability

The Keighery vegetation disturbance scale in the Dieback Interpreter's Manual (**Table 1**) was used to determine the assessability of vegetated areas within the assessment area.

Areas with a vegetation condition rating of 1-3 (Pristine - Very Good) and enough disease indicator species present to enable a diagnosis of the disease status are considered assessable.

Other areas of vegetation may be categorised as Possibly Assessable based on a condition rating of 4 (Good). In these areas, significant impacts to vegetation, including grazing, forestry harvesting, weed incursion and frequent fire events, have altered vegetation composition and structure so that it is unlikely to recover in the medium to long-term. Assessability of these areas is at the discretion of the Interpreter.

Areas where native vegetation is significantly degraded or cleared are given a condition rating of 5 (Degraded) or 6 (Completely Degraded) and classified as Excluded from assessment. Non-vegetated areas are also excluded from assessment, including pasture, pits (including gravel pits), large roads (sealed and unsealed), permanently flooded areas and parkland tree stands.

Table 1: Keighery vegetation disturbance scale and assessability (Keighery 1994, as defined in FEMD 2015)

Assessability	Scale		Condition
Assessable	1	Pristine	Pristine or nearly so, no obvious signs of disturbance.
	2	Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
	3	Very Good	Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, Dieback, logging and grazing.
Possibly assessable, discretion required	4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, Dieback and grazing.
Not assessable or excluded from assessment	5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, Dieback and grazing.
	6	Completely Degraded	The structure of the vegetation is no longer intact, and the area is completely or almost completely without native species. These areas are often described as "parkland cleared" with the flora comprising weed or crop species with isolated native trees or shrubs.

3.3.4 Dieback Occurrence Categories

The assessability of vegetated and non-vegetated areas and associated Phytophthora Dieback occurrence categories can be determined using **Table 2**.

Uninfested vegetation exhibits the following characteristics:

- No positive sample results received for *P. cinnamomi*.
- An acceptable diversity of healthy disease indicator species is present, including some of the following genera: *Banksia*, *Persoonia*, *Xanthorrhoea*, *Leucopogon*, *Hakea* and *Adenanthos*.
- Vegetation condition is in Pristine-Very Good (1-3) condition according to the Keighery scale with a good density of vegetation cover and no obvious reduction in biomass or masking by resistant species.
- No evidence found of disease pattern or chronology.

Infested vegetation is identified and characterised by the following features:

- Positive sample results for *P. cinnamomi* are found either in the immediate area, upslope or upstream of the infested area.
- Multiple disease indicator species deaths (ISDs) are occurring.
- Disease pattern and chronology is visible.
- Vegetation structure and composition is obviously altered.

Uninterpretable vegetation exhibits the following characteristics:

- Insufficient amounts of disease indicator species are present, including the following genera: *Banksia*, *Persoonia*, *Xanthorrhoea*, *Leucopogon*, *Hakea* and *Adenanthos*.
- Vegetation condition is in Pristine-Very Good (1-3) condition according to the Keighery scale with a good density of vegetation cover, possible masking by resistant species and no obvious reduction in biomass.
- Environmental conditions occur that discourage the pathogen, such as low rainfall, highly fertile soils where the plants are healthier, sandy free-draining soils and vegetation with fewer host species or a dominating resistant host.

Uninterpretable areas may contain Dieback (e.g. in very low levels as an endemic or incipient disease) without showing signs of its presence. Determining the presence of the pathogen is not possible using interpretation methods (FEMD 2015). Uninterpretable areas that meet the protocols for identifying Protectable Areas are managed as being both infested and uninfested so that the pathogen is neither imported into, nor exported from, these areas.

The temporarily uninterpretable category is allocated to areas of native vegetation that have been disturbed but will recover over time and become interpretable and mappable in the future (i.e. within five years). Examples of temporarily uninterpretable areas include vegetation that has been impacted by fire, timber harvesting, grazing, flooding or mining with subsequent rehabilitation (FEMD 2015).

Excluded areas (see **section 3.3.2**) are distinguished from temporarily uninterpretable areas in that they cannot normally regenerate naturally and become mappable for Dieback occurrence in the future.

Table 2: Assessability of vegetated and non-vegetated areas (adapted from FEMD 2015)

	<i>Phytophthora</i> occurrence category	Typically present	May be present
Naturally vegetated areas Keighery disturbance rating of 3 or less. <i>Phytophthora</i> occurrence categorisation is possible. Small unvegetated areas can exist and may be included in the assessment area considering total environmental context.	INFESTED	Dead and dying reliable indicator species	Healthy reliable indicator species Indicator Species Deaths (ISDs) that have been killed by other agents
	UNINFESTED	Healthy reliable indicator species	ISDs that have been killed by other agents
	UNINTERPRETABLE	Very few reliable indicator species	Occasional reliable indicators, but too few for <i>Phytophthora</i> Dieback interpretation
	NOT YET RESOLVED	Usually reliable indicator species in an environment not favourable to disease development	Negative sample results for all <i>Phytophthora</i> species
Vegetation structure temporarily altered <i>Phytophthora</i> occurrence assessment will be possible when vegetation structure recovers. Recovery times will be variable depending on severity and type of disturbance.	TEMPORARILY UNINTERPRETABLE	Indicator species masked by disturbance typically from fire, harvesting, temporary flooding, poisoning	Occasional reliable indicator species, but disturbance prevents accurate placement of <i>Phytophthora</i> occurrence
Road disturbance area	DISEASE RISK ROAD (DRR)	Unformed track with shoulders of interpretable vegetation	Shoulders and batters with regenerated vegetation Incipient infestation
Vegetation structure severely altered Keighery disturbance rating 5 or greater. <i>Phytophthora</i> occurrence assessment is not possible. Can be determined by desktop assessment (aerial photo). Small vegetated areas can exist and may be excluded from the assessment area considering total environmental context.	EXCLUDED	Pasture, pits, easements, infrastructure, large roads (sealed and unsealed) permanent flooding, plantations, parkland tree stands	Sporadic reliable indicator species

3.3.5 Hypothesis

Comprehensive Dieback assessment of Shire of Mundaring Priority Bushland Reserves is testing the hypothesis that “disease indicator species deaths and changes in vegetation community composition and structure are the result of *Phytophthora cinnamomi* infestation.”

3.3.6 Sampling Strategy and Methods

Sampling strategies for the assessment of Dieback aim to resolve the following scenarios:

- Sampling to support an infested diagnosis - recently dead and dying indicator species are sampled to support an Interpreter’s diagnosis of an area as Infested.
- Sampling to support an uninfested diagnosis - recently dead and dying indicator species are sampled to support an Interpreter’s diagnosis of an area as uninfested.

Potential sample locations were selected throughout the assessment area to test the hypothesis in **section 3.3.5**. These potential sample locations were allocated a rating from 1-5 as defined in **Table 3**. Final sample locations were selected by geographic location, ensuring samples were spread throughout the assessment area and in areas that would adequately test the hypothesis. This includes sampling ISDs that would support either an uninfested or infested diagnosis and ISDs in both upland and low-lying areas and along roadsides.

Table 3: Sample requirement rating and description (adapted from FEMD 2015)

Rating	Importance	Description
1	Low requirement for sampling	The result is not expected to alter the assessment outcome, e.g. area that is obviously infested with multiple observable factors.
2	Low requirement for sampling	The result is not expected to alter the assessment outcome, but the site may have value for training purposes.
3	Moderate requirement for sampling	The results may add extra evidence to a particular strategy. Soil and tissue samples may be taken from these sites where Interpreters are required to provide extra evidence for sensitive or difficult areas or where further proof is needed to support field diagnosis. Sites rated ‘3’ may be left not sampled.
4	High requirement for sampling	The results of these samples will be critical to the assessment outcome; however, occasional sample sites with this rating may not be sampled at the completion of the assessment.
5	High requirement for sampling	The results of these samples will be critical to the assessment outcome. All sites rated ‘5’ will be sampled.

The following sampling strategy for the assessment area was used:

- The aim was to take at least one sample in each reserve except where the reserve was uninterpretable or in a Degraded condition and therefore could not be assessed.
- More samples were taken in the larger reserves or in reserves where disease expression was subtle.
- A minimum number of samples was taken in reserves where there was obvious active disease and enough visual evidence to make a determination with a high level of confidence.
- Additional samples were taken, or samples were retested (through rebaiting or DNA test) where a positive result was expected but not returned (i.e. a false negative result).

- The hypothesis was reformulated if the second test returned the same unexpected result to test for other factors causing ISDs and changes to community composition and structure (e.g. drought, cankers *Armillaria luteobubalina*, fire).

Samples must be collected of soil and tissue from recently dead or dying disease indicator species to confirm the presence, or indicate the possible absence, of Dieback and to inform interpretation of the assessment area. Caution must be applied to interpreting the results of sampling and claiming that an area is uninfested. Prolonged unfavourable conditions for *Phytophthora cinnamomi* can lead to false negative results due to low levels of inoculum present in a sample. Sample results should be considered within the context of other field evidence, including disease vectors, pattern, chronology, biomass reduction and changes in vegetation structure.

In order to minimise contamination of test sites and samples, all sampling strictly adhered to the following procedures:

- All tools used in sampling were thoroughly sterilised with a 70:30 mixture of methylated spirits and water before samples were taken. Tools were dry prior to sampling so that the results were not compromised.
- The plant sampled was excavated to a depth that ensured adequate plant tissue material could be obtained from the roots and cambium layer around the collar of the plant being sampled (not more than 150 mm depth).
- Material from all around the plant was taken in addition to any obvious lesions to avoid missing any infected material. Plant tissue material plus soil from around the roots and other places in the soil profile were placed in a polythene bag.
- All relevant information pertaining to the plant sampled and sample location was recorded on the Sample Information Sheet.
- Two aluminium tags that provided the date, project name, sample number, species sampled, and the name of the Interpreter were prepared. One tag was placed in the sample bag, and the other was tied near the sample site, which was also demarcated with fluorescent pink flagging tape.
- The sample hole was backfilled to prevent fauna from becoming trapped.
- All tools were brushed off to remove excess soil and sterilised to prevent contamination of the next sample site and sample.

Dieback assessment is conducted in a manner to ensure it does not spread Dieback within the assessment area. The following procedures are followed:

- Start all field assessments with a clean vehicle and footwear free of soil and vegetative material.
- Where possible only work in dry conditions (i.e. when soil is not adhering) to reduce spreading of soil from footwear and vehicle movement.
- In wet conditions on more exposed soils, carry a small cleaning brush and spray bottle with a 70:30 solution methylated spirits/water to remove soil and mud from footwear when moving from infested to uninfested areas.

In wet conditions:

- Aim to work from Uninfested into Infested or Uninterpretable or Excluded areas.
- Drive vehicle only on well-formed tracks avoiding muddy and wet areas.
- If Uninfested areas need to be entered, complete an in-field vehicle inspection and clean down if required.
- If a water-crossing or muddy area must be driven through, drive through slowly to reduce mud-spraying and complete an in-field vehicle inspection and clean down if required.

In-field vehicle cleaning can be difficult to achieve. An in-field vehicle inspection and clean down involves the following process:

- Before entering an Uninfested area or after completing a water/mud-crossing, stop at an appropriate site as soon as possible. This should be a dry and sandy or hard-pan location in the Infested area, draining onto or into the Infested area.
- Remove soil and mud from tyres, bumper, wheel arches, steps and under the vehicle.
- Spray down the undercarriage and wheels of the vehicle with 70:30 solution methylated spirits/water.
- Spray all equipment used to clean the vehicle and footwear with 70:30 solution methylated spirits/water.

3.3.7 Demarcation

The following buffers were applied during the assessment in accordance with the Dieback Interpreter's Manual:

- Minimum upslope buffer of 15 m depending on complexity of disease expression.
- Minimum downslope buffer of 25 m depending on degree of slope, drainage patterns, soil type and geology.

Only two reserves have infested areas demarcated (Black Cockatoo Reserve and the Superblock (incl. previous Wildflower Seed Reserve 36428) along Ryecroft Road). Demarcation flagging tape had been applied to guide dieback treatment activities in the reserves in 2019 where treatment was undertaken by the Shire. Demarcation was applied as per the guidelines in the Dieback Interpreter's Manual using 25 mm fluorescent pink flagging tape. No other demarcation buffers were observed in any of the other reserves assessed.

3.4 Mapping

Spatial data, including tracks and waypoints recorded on hand-held GPS units, were downloaded into a GIS program. The GIS software used for the project was QGIS 3.4 (QGIS Development Team 2019).

Field evidence and observations plus spatial data were used to prepare a Dieback occurrence map for each reserve assessed. Phytophthora occurrence categories were mapped using the categories defined in **Table 2**.

Dieback occurrence mapping is deemed valid for 12 months after the assessment is completed to counter for autonomous spread of the pathogen (FEMD 2015).

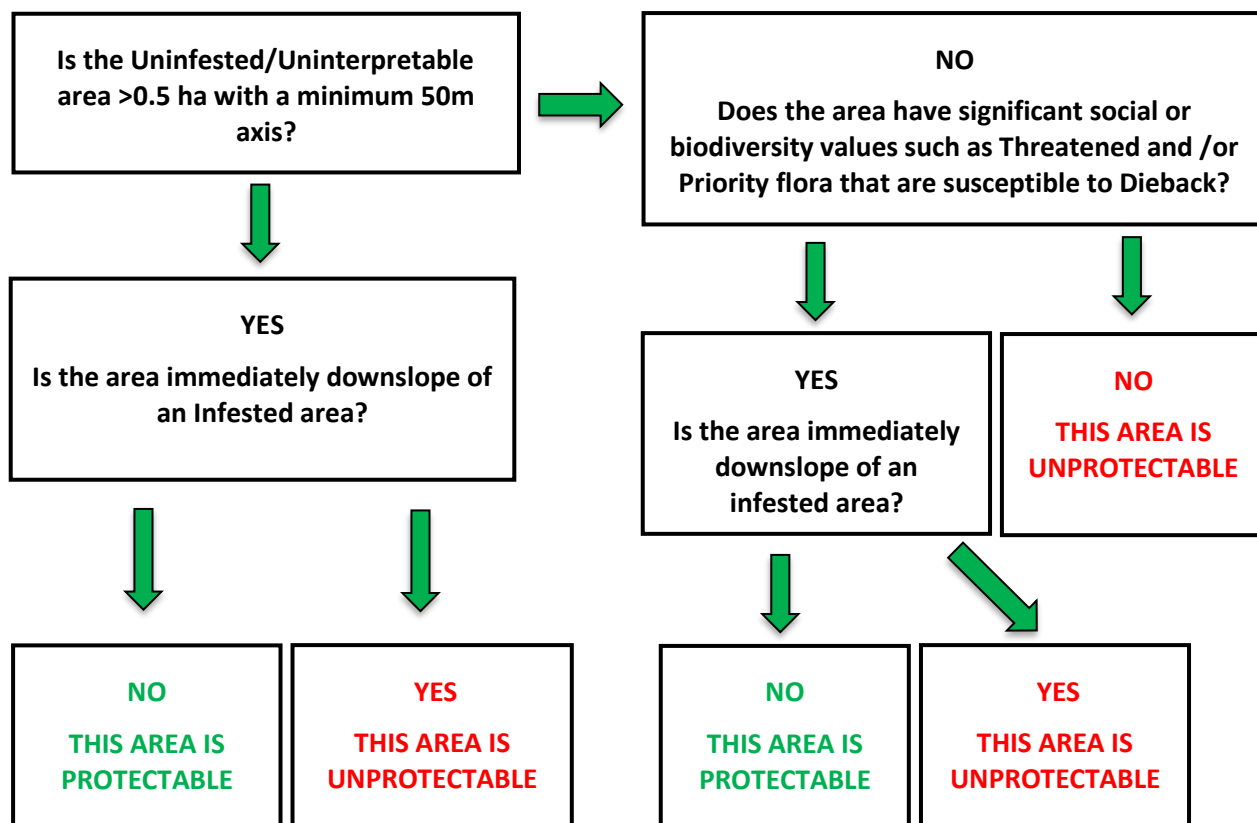
3.5 Protocols for Identifying Protectable Areas

The Dieback Interpreter's Manual outlines the following primary criteria for defining protectable areas as those areas that:

- Have been determined to be free of the *Phytophthora* spp. pathogen by a registered Dieback Interpreter (all susceptible indicator plant species are healthy, and no plant disease symptoms normally attributed to Phytophthora Dieback are evident).
- Are in locations receiving >600 mm rainfall per year or are water-gaining sites (e.g. granite outcrops, impeded drainage or engineering works that aggregate rainfall) in the 400-600 mm per year rainfall range.
- Consist of areas where human vectors are controllable (e.g. not an open road, private property).
- Are positioned in the landscape and are of sufficient size (e.g. >4 ha with axis >100 m) such that a qualified Interpreter judges that the pathogen will not autonomously engulf them in the short term (a period of a few decades).
- Include areas of high conservation and/or socio-economic value (e.g. a small uninfested area with a known population of a susceptible species of threatened flora) (FEMD 2015).

Terratree has developed a decision-making flowchart for determining whether uninfested and uninterpretable areas are protectable (**Diagram 1**).

Diagram 1: Decision-making flowchart for assessing protectable areas



Note: Uninterpretable areas may or may not be infested with Dieback therefore any management decisions should take this into account.

Recommended protocols for treatment of protectable uninfested areas:

1. A 10-25m wide buffer along the disease edge should be demarcated with flagging tape and treated with phosphite. Demarcation and treatment should be undertaken by experienced Dieback Treatment Consultants.
2. Inject Jarrah (*Eucalyptus. marginata* subsp. *marginata*) and *Banksia grandis* trees within buffer zone with phosphite.
3. Spray susceptible vegetation in the understory with phosphite.
4. Create photo points along treated buffer to monitor disease activity on an annual basis.
5. Install Standard Protocol Dieback Signage along tracks and access points into protectable areas.

Note: These are general protocols and should be customised for each situation in consultation with suitably qualified dieback treatment personnel.

Standard protocols for determining Protectable areas have been developed within the context of large (several hundred hectares) state forest blocks. The Shire of Mundaring reserves range in size, from the largest being approximately 100ha to the smallest being less than 1ha. Local Government nature reserves have different social values and are managed for biodiversity conservation and recreation, as opposed to state forest, which is managed mainly for timber resources while at the same time aiming to protect biodiversity. Because of this, Terratree has developed a classification system in consultation with the Shire of Mundaring, for determining Protectable areas (Table 4).

Unprotectable areas shown in the figures (**Appendix B**) are areas which have been determined to be unprotectable due to their small size, shape and/or landscape position in relation to infested areas. Measurements in 2002 show that downslope rate of spread can be 10 to 20 times greater than upslope spread (FEMD 2015), however, the actual rate will depend on soil type, soil profile, degree of slope, vegetation cover and susceptibility. The average rate of spread of Dieback is one metre per year (Podger *et al.* 1996), on flat ground. Therefore the downslope spread can range between 1-20m per year based on the 2002 measurements.

Table 4: Categorisation of protectable areas for the Shire of Mundaring assessment

Protectability Category	Size of Uninfested Area (ha and axis)	Landscape Position	Protectability Time Frame (based on rates of spread ranges)
Unprotectable	<0.5 ha, <50m axis	Adjacent to Infestation either up or down slope	Short-term (1-20 years)
Protectable	0.5 – 4 ha, 50 – 100m axis	Downslope of or surrounded by Infestation	Medium-term (20-50 years)
	>4 ha, >100m axis	Downslope of or surrounded by Infestation	Long-term (50-100 Years)
	>4 ha, >100m axis	Upslope of Infestation	Very Long-term (>100 Years)

3.6 Determining Rehabilitation Trial Site Locations

There are large areas of nature reserves that are already dieback infested or unprotectable in the long term. Rehabilitation through revegetation with less susceptible species may be the most effective way to maintain ecological structure and habitat values in dieback affected areas. There is a significant knowledge gap in terms of which species are susceptible or resistant and understanding of the variation of susceptibility within species in across different soil types. Many listings are based on field observation without laboratory confirmation or field trials to support observations.

A desktop assessment to determine reserves suitable for establishing rehabilitation trial plots was conducted following completion of the comprehensive Dieback assessment. The desktop assessment identified 10 reserves based on the following criteria:

1. Represent all reserves with Dieback infestations in the dominant soil and vegetation types that occur across the Shire of Mundaring.
2. Have active disease present so the impact of the pathogen on individual species can be determined. The selected reserves also needed to have uninfested areas where control plots can be established to eliminate other factors influencing species survival, such as drought.

3.7 Determining Signage Locations

Recommendations for the location of Standard Protocol Dieback Signage within reserves that have protectable areas were determined by considering the following factors:

1. **Frequency of use:** locate signs along tracks and trails within the reserves that are most used by the public for bushwalking, bike riding, horse riding and other recreational activities.
2. **High risk areas:** locate signs exiting wet or muddy areas where tracks enable access into protectable and upland areas.
3. **Visibility:** locate signs in areas where they are highly visible to the public.

Where reserves already have Dieback signage in place the location, condition and currency of the signage was assessed and reported on.

3.8 Limitations

The following limitations were encountered during the Phytophthora Dieback assessment:

- The natural vegetation composition in some areas meant there was a lack of disease indicator species; therefore, an uninterpretable category rating was assigned according to the Dieback Interpreter's Manual. These areas should be treated as Infested and Uninfested.
- The natural vegetation within some areas was Degraded or Completely Degraded, which meant the Excluded category was assigned according to the Dieback Interpreter's Manual and could not be assessed for the presence of Dieback.
- The impact of drought on susceptible vegetation made interpretation and disease mapping more difficult.
- False-negative sample results complicated interpretation and required re-testing.

4 Results

4.1 Desktop Review

All reserves were previously surveyed in a broadscale ecological assessment in 2017-2018 by Terratree. The findings of this assessment are presented in the Priority Reserves Ecological Assessment Report 2018 (Terratree 2018). A comprehensive Dieback assessment was also completed at Nan Macmillan Reserve in 2018 by Terratree.

A Dieback Management Plan for Falls Road was obtained that referred to a Dieback assessment completed in 1999. No other Dieback assessment reports were available.

Evidence of Dieback boundary delineation (yellow blazing - trees painted yellow on three sides which points towards the Infested area, understood to be completed by Dieback Treatment Services) was observed during the assessment in Black Cockatoo Reserves (north), the Superblock (incl. previous wildflower seed reserve 36428) and Alps Street Reserve.

The desktop review identified historic positive sample results from the DIDMS database for *Phytophthora cinnamomi* within the assessment area. These were located within, or near, to the following reserves:

- Binbrook Park
- Black Cockatoo Reserves (south)
- Cookes Brook
- Jane Byfield Reserve
- Mathieson Road Transfer Station
- Milligan Road Reserve
- North Darlington Reserves (incl. Nan Macmillan Reserve)
- Old Parkerville School Site
- Railway Reserve, Hovea – Chidlow
- Roland Road Reserve
- Southern Heritage Railway Trail, Boya - Mundaring
- Strettle Road Reserve
- Superblock (incl. previous Wildflower Seed Reserve 36428).

Individual reserve Dieback occurrence maps included in **Appendix A** show all historic *Phytophthora* species positive sample locations.

4.2 Disease Indicator Species

Disease indicator species observed within the assessment area include, but are not limited to, representatives of the Proteaceae, Ericaceae, Fabaceae and Xanthorrhoeaceae families. Disease indicator species observed during the field survey are listed in **Table 5**.

Banksia grandis, *B. sessilis*, *Xanthorrhoea preissii* and *X. gracilis* were the most reliable primary indicator species within the assessment area. Secondary indicators, including *Adenanthos barbiger*, *Allocasuarina humilis*, *Andersonia lehmanniana*, *B. bipinnatifida*, *B. dallanneyi*, *B. squarrosa*, *Daviesia decurrens*, *Eucalyptus marginata*, *Leucopogon capitellatus*, *L. nutans*, *L. propinquus*, *Macrozamia reidleyi*, *Patersonia occidentalis*, *Personia elliptica* and *X. acanthostachya* were also used to inform interpretation.

Table 5: Disease indicator species within the assessment area

Family	Species
Casuarinaceae	<i>Allocasuarina humilis</i>
Ericaceae	<i>Andersonia lehmanniana</i>
	<i>Leucopogon capitellatus</i>
	<i>Leucopogon nutans</i>
	<i>Leucopogon propinquus</i>
	<i>Leucopogon pulchellus</i>
	<i>Leucopogon verticillata</i>
	<i>Styphelia tenuiflora</i>
Fabaceae	<i>Daviesia decurrens</i>
Iridaceae	<i>Patersonia occidentalis</i>
Myrtaceae	<i>Eucalyptus marginata</i>
Proteaceae	<i>Adenanthos barbiger</i>
	<i>Banksia armata</i>
	<i>Banksia bipinnatifida</i>
	<i>Banksia dallanneyi</i>
	<i>Banksia grandis</i>
	<i>Banksia sessilis</i>
	<i>Banksia squarrosa</i>
	<i>Grevillea bipinnatifida</i>
	<i>Hakea amplexicaulis</i>
	<i>Hakea cristata</i>
	<i>Hakea erinaceae</i>
	<i>Hakea lissocarpha</i>
	<i>Hakea petiolaris</i>
	<i>Hakea prostrata</i>
	<i>Hakea ruscifolia</i>
	<i>Hakea trifurcata</i>
	<i>Hakea undulata</i>
	<i>Isopogon dubius</i>
	<i>Persoonia elliptica</i>
	<i>Petrophile striata</i>
Xanthorrhoeaceae	<i>Xanthorrhoea acanthostachya</i>
	<i>Xanthorrhoea gracilis</i>
	<i>Xanthorrhoea preissii</i>
Zamiaceae	<i>Macrozamia riedlei</i>

4.3 Sample Results

Seventy-three soil and tissue samples were taken from 31 reserves during the Dieback assessment. While it was not possible to take samples in Marriot Park and Milligan Road reserves due to them being Uninterpretable, one sample was obtained from Cookes Brook Reserve, despite it also being Uninterpretable.

Forty-two samples returned positive results for *Phytophthora cinnamomi* through diagnostic baiting. Sixteen samples were retested after receiving an unexpected negative result and six of these returned positive results for *P. cinnamomi*. One sample, as Alps street reserve (SoM19S58), was sent to the CPSM at Murdoch University for DNA testing to determine the species of *Phytophthora* and returned a positive result for *P. multivora*.

Sample results which were positive for *Phytophthora* spp. are summarised in **Table 6**. All individual reserve sample results, including negative results are presented in **Appendix B**. The VHS laboratory *Phytophthora* testing results are provided in **Appendix C**.

Table 6: Positive Sample results

Reserve Name	Sample ID	Species	Easting	Northing	Result	Retest Result
Alps Street Reserve	SOM19S56	<i>Banksia sessilis & Xanthorrhoea gracilis</i>	425107	6471858	<i>P. cinnamomi</i>	N/A
Alps Street Reserve	SOM19S57	<i>Banksia sessilis & Xanthorrhoea gracilis</i>	425239	6472182	<i>P. cinnamomi</i>	N/A
Alps Street Reserve	SOM19S59	<i>Banksia sessilis & Xanthorrhoea gracilis</i>	425473	6471413	<i>P. cinnamomi</i>	N/A
Alps Street Reserve	SOM19S58	<i>Banksia grandis</i>	425502	6471626	<i>P. multivora</i>	N/A
Beechina Railway Reserve	SOM19S09	<i>Xanthorrhoea preissii</i>	435605	6474218	<i>P. cinnamomi</i>	N/A
Binbrook Park	SOM19S62	<i>Xanthorrhoea gracilis</i>	413400	6468579	<i>P. cinnamomi</i>	N/A
Binbrook Park	SOM19S63	<i>Xanthorrhoea gracilis</i>	413393	6468368	<i>P. cinnamomi</i>	N/A
Black Cockatoo Reserves (north)	SOM19S01	<i>Xanthorrhoea preissii</i>	422447	6471466	<i>P. cinnamomi</i>	N/A
Callan Road Reserve	SOM19S27	<i>Xanthorrhoea gracilis</i>	415493	6471632	<i>P. cinnamomi</i>	N/A
Cameron Road Reserve	SOM19S16	<i>Banksia grandis & Patersonia sp.</i>	422739	6477130	<i>P. cinnamomi</i>	N/A
Carawatha Reserve	SOM19S25	<i>Xanthorrhoea preissii & Patersonia occidentalis</i>	418140	6472294	Negative	<i>P. cinnamomi</i>
Chidlow Oval	SOM19S20	<i>Banksia squarrosa</i>	430919	6474169	<i>P. cinnamomi</i>	N/A
Cookes Brook	SOM19S17	<i>Xanthorrhoea preissii</i>	428833	6476999	<i>P. cinnamomi</i>	N/A
Falls Road Reserve	SOM19S32	<i>Banksia sessilis</i>	417238	6473049	<i>P. cinnamomi</i>	N/A
Gilfellon Reserve	SOM19S23	<i>Xanthorrhoea gracilis</i>	422293	6473349	<i>P. cinnamomi</i>	N/A
Glynden Reserve	SOM19S61	<i>Xanthorrhoea gracilis</i>	409505	6468841	<i>P. cinnamomi</i>	N/A
Hilltop Reserve	SOM19S35	<i>Xanthorrhoea gracilis</i>	418805	6469989	<i>P. cinnamomi</i>	N/A
Hovea Conservation Park	SOM19S64	<i>Xanthorrhoea gracilis</i>	418103	6471214	<i>P. cinnamomi</i>	N/A
Hovea Conservation Park	SOM19S65	<i>Xanthorrhoea gracilis</i>	417010	6471683	<i>P. cinnamomi</i>	N/A
Hovea Conservation Park	SOM19S66	<i>Xanthorrhoea gracilis</i>	417123	6471409	<i>P. cinnamomi</i>	N/A
Jane Byfield Reserve	SOM19S34	<i>Xanthorrhoea gracilis</i>	418291	6470233	<i>P. cinnamomi</i>	N/A
Lechenaultia Park	SOM19S18	<i>Xanthorrhoea gracilis</i>	427117	6473363	<i>P. cinnamomi</i>	N/A
Marloo Theatre Reserve	SOM19S60	<i>Xanthorrhoea preissii</i>	410349	6470656	<i>P. cinnamomi</i>	N/A
Nan Macmillan	SoM1	<i>Banksia squarrosa</i>	413609	6469976	<i>P. cinnamomi</i>	N/A
Nan Macmillan	SoM2	<i>Banksia sessilis</i>	413648	413648	<i>P. cinnamomi</i>	N/A

Reserve Name	Sample ID	Species	Easting	Northing	Result	Retest Result
Nan Macmillan	SoM4	<i>Banksia sessilis</i>	413336	6469813	<i>P. cinnamomi</i>	N/A
Nan Macmillan	SoM5	<i>Banksia grandis</i>	413430	6469877	<i>P. cinnamomi</i>	N/A
Old Parkerville School Site	SOM19S26	<i>Xanthorrhoea gracilis</i>	418182	6472379	<i>P. cinnamomi</i>	N/A
Pindalup Reserve	SOM19S05	<i>Banksia squarrosa</i>	434543	6481028	<i>P. cinnamomi</i>	N/A
Quail Street Reserve	SOM19S12	<i>Xanthorrhoea preissii</i>	427012	6478446	<i>P. cinnamomi</i>	N/A
Quail Street Reserve	SOM19S44	<i>Xanthorrhoea gracilis</i>	426135	6477917	<i>P. cinnamomi</i>	N/A
Quail Street Reserve	SOM19S44b	<i>Leucopogon propinquus</i>	426853	6478009	<i>P. cinnamomi</i>	N/A
Quail Street Reserve	SOM19S15	<i>Xanthorrhoea preissii</i>	426487	6478128	Negative	<i>P. cinnamomi</i>
Railway Reserve, Hovea - Chidlow	SOM19S51	<i>Xanthorrhoea gracilis</i>	417257	6472439	<i>P. cinnamomi</i>	N/A
Railway Reserve, Hovea - Chidlow	SOM19S46	<i>Xanthorrhoea preissii</i>	424005	6472498	Negative	<i>P. cinnamomi</i>
Railway Reserve, Hovea - Chidlow	SOM19S48	<i>Xanthorrhoea preissii</i>	419251	6472435	Negative	<i>P. cinnamomi</i>
Roland Road Reserve	SOM19S24	<i>Xanthorrhoea gracilis</i>	417639	6477124	<i>P. cinnamomi</i>	N/A
Rosedale Road Reserve	SOM19S19	<i>Xanthorrhoea preissii</i>	430122	6475400	Negative	<i>P. cinnamomi</i>
Southern Railway Heritage Trail, Boya - Mundaring	SOM19S37	<i>Xanthorrhoea preissii</i>	425331	6470714	<i>P. cinnamomi</i>	N/A
Southern Railway Heritage Trail, Boya - Mundaring	SOM19S38	<i>Xanthorrhoea gracilis</i>	422738	6470062	<i>P. cinnamomi</i>	N/A
Southern Railway Heritage Trail, Boya - Mundaring	SOM19S39	<i>Xanthorrhoea gracilis</i>	422112	6469592	<i>P. cinnamomi</i>	N/A
Southern Railway Heritage Trail, Boya - Mundaring	SOM19S40	<i>Xanthorrhoea preissii</i>	416205	6469096	<i>P. cinnamomi</i>	N/A
Southern Railway Heritage Trail, Boya - Mundaring	SOM19S41	<i>Xanthorrhoea gracilis</i>	410314	6469208	<i>P. cinnamomi</i>	N/A
Strettle Road Reserve	SOM19S30	<i>Banksia grandis</i>	417064	6469869	<i>P. cinnamomi</i>	N/A
Strettle Road Reserve	SoM19S52	<i>Bankia sessilis</i> & <i>Xanthorrhoea gracilis</i>	417749	6469579	<i>P. cinnamomi</i>	N/A
Strettle Road Reserve	SOM19S53	<i>Xanthorrhoea preissii</i>	417225	6469133	Negative	<i>P. cinnamomi</i>
Superblock (incl. previous wildflower seed reserve 36428)	SOM19S67	<i>Xanthorrhoea preissii</i>	413770	6468583	<i>P. cinnamomi</i>	N/A
Superblock (incl. previous wildflower seed reserve 36428)	SOM19S69	<i>Xanthorrhoea gracilis</i>	414400	6468068	<i>P. cinnamomi</i>	N/A
Thomas Street Reserve	SOM19S36	<i>Xanthorrhoea gracilis</i> & <i>Banksia sessilis</i>	415922	6469102	<i>P. cinnamomi</i>	N/A

4.5 Dieback Occurrence Summary for Shire of Mundaring Priority Bushland Reserves

Dieback was recorded in 31 of the 33 reserves assessed. Dieback was found to be widespread in the lower slopes, along drainage lines and water-gaining sites in 30 of the 33 reserves assessed. Infestations were also frequently mapped along access tracks, trails, firebreaks, old gravel pits and disturbed areas within the reserves. One reserve, Cookes Brook, was Uninterpretable but recorded a spot infestation at a positive sample.

Dieback occurrence within each reserve is summarised in **Table 7**. All individual reserve results including Dieback occurrence maps and photographs are presented in **Appendix B**.

Table 7: Dieback occurrence summary for Shire of Mundaring Priority Bushland Reserves

Reserve Name	Reserve Number	Suburb	Reserve Size (total ha)	Dieback Occurrence				Excluded (due to Vegetation Condition) ha %
				Infested ha %	Uninfested ha %	Uninfested Unprotectable ha %	Uninterpretable ha %	
Alps Street Reserve	34103	Mount Helena	55.25	10.85	43.34		1.06	
				19.64	78.44		1.92	
Beechina Rail Reserve	35397	Chidlow	6.68	3.04	1.66	0.53	0.59	0.86
				45.51	24.85	7.93	8.83	12.87
Binbrook Park	1847	Darlington	7.46	2.56	4.15	0.65		0.1
				34.32	55.63	8.71		1.34
Black Cockatoo Reserves (north)	20990	Mundaring	13.01	9.09	3.92			
				69.87	30.13			
Black Cockatoo Reserves (south)	12422	Mundaring	18.51	9.98	8.2	0.33		
				53.92	44.30	1.78		
Callan Road Reserve	38224	Hovea	7.04	4.09	1.62		1.33	
				58.10	23.01		18.89	
Cameron Road Reserve	37837	Stoneville	6.37	3.21	1.75	1.01		0.4
				50.39	27.47	15.86		6.28
Carawatha Road Reserve	13766	Parkerville	0.43	0.12	0.31			
				27.91	72.09			
Chidlow Oval	23921	Chidlow	9.99	1.13			0.57	8.29
				11.31			5.71	82.98
Cokes Brook	38367	Chidlow	9.01				6.66	2.35
							73.92	26.08
Falls Road Reserve	12453	Hovea	19.68	5.88	12.11		1.58	0.11
				29.88	61.53		8.03	0.56

Gilfellon Reserve	31264	Stoneville	2.96	0.54		0.06	1.51	0.85
				18.24		2.03	51.01	28.72
Glynden Reserve	29959	Helena Valley	1.34	0.08	0.2	0.09	0.21	0.76
				5.97	14.93	6.72	15.67	56.72
Hilltop Reserve	41670	Mahogany Creek	1.14	0.3	0.32	0.1	0.33	0.09
				26.32	28.07	8.77	28.95	7.89
Hovea Conservation Park	14163	Parkerville	40.88	16.71	2.82	16.81	0.84	3.7
				40.88	6.90	41.12	2.05	9.05
Jane Byfield Reserve	880	Mahogany Creek	0.63	0.34			0.07	0.22
				53.97			11.11	34.92
Lechenaultia Park	25433	Chidlow	4.05	1	0.39	0.38	0.31	1.97
				24.69	9.63	9.38	7.65	48.64
Marloo Theatre Reserve	36045	Greenmount	3.01	0.05	0.42	0.06	0.1	2.38
				1.66	13.95	1.99	3.32	79.07
Marriott Park	25700	Boya	1.14				0.09	1.05
							7.89	92.11
Mathieson Road Transfer Station	31053	Chidlow	51.82	23.05	14.1			14.67
				44.48	27.21			28.31
Milligan Road Reserve	22843	Stoneville	2.43				1.61	0.82
							66.26	33.74
Nan Macmillan Reserve		Darlington	16.31	15.6			0.71	
				95.65			4.35	
North Darlington Reserves	6922	Darlington	20.46	6.53	10.39	0.05	1.26	2.23
				31.92	50.78	0.24	6.16	10.90
Old Parkerville School Site	13214	Parkerville	1.59	0.69		0.13	0.29	0.48
				43.40		8.18	18.24	30.19
Pindalup Reserve	39853	Wooroloo	40.31	0.44	35.46			4.41
				1.09	87.97			10.94
Quail Street Reserve	29269	Chidlow	105.29	81.7	23.3		0.29	
				77.60	22.13		0.28	

Railway Reserve, Hovea - Chidlow	32484	Hovea, Parkerville, Stoneville, Chidlow	83.75*	16.01	8.82	2.4	25.11	29.91
				19.12	10.53	2.87	29.98	35.71
Roland Road Reserve	45986	Parkerville	1.5	0.65	0.07	0.65		0.13
				43.33	4.67	43.33		8.67
Rosedale Road Reserve	22659	Chidlow	1.01	0.2	0.81			
				19.80	80.20			
Sexton Street Reserve	10924	Mount Helena	2.96	1.21	1.44	0.31		
				40.88	48.65	10.47		
Southern Railway Heritage Trail, Boya - Mundaring	31196	Boya, Darlington, Glen Forrest, Mahogany Creek, Mundaring	101.73	41.39	3.29	1.75	15.1	40.2
				40.69	3.23	1.72	14.84	39.52
Strettle Road Reserve	32727	Mahogany Creek	70.79	49.33	19.34	2.12		
				69.68	27.32	2.99		
Superblock (incl. previous wildflower seed reserve 36428)	50018	Glen Forrest	51.28	17.97	30.03	0.29	1.23	1.76
				35.04	58.56	0.57	2.40	3.43
Thomas Street Reserve	31066	Glen Forest	1.84	0.77	0.08	0.24	0.11	0.64
				41.85	4.35	13.04	5.98	34.78

*some small areas temporarily uninterpretable and not assessed

4.6 Protectable Areas

Uninfested areas in three reserves were mapped as Unprotectable from dieback infestation due to their very small size (<0.5ha) or other factors, such as landscape position. Twenty-six (26) reserves had Uninfested areas which were potentially protectable. The Uninfested areas in these reserves were assessed against the Protectability criteria outlined in **Table 4** to determine an indicative protectability time frame. The three Uninterpretable reserves were not included in the assessment. Uninfested areas in Alps street, Pindalup Reserve and Superblock were determined to be protectable in the very long term (more than 100 years). A total of six reserves were determined to be protectable in the long term (50 to 100 years). A further six were determined to be protectable in the medium term (20 to 50 years). Uninfested areas in four reserves were considered protectable in the short to medium term. While these areas are larger than 0.5ha, they have a small axis and or landscape positions relative to Dieback which put them at risk. Uninfested areas in the seven other reserves were considered Unprotectable. These areas are only protectable in the short-term (less than 20 years).

Reserves with potentially protectable areas have been ranked according to the total size of their Uninfested area and are listed in **Table 8**.

The conclusions of this protectability assessment (**Table 8**) should be reviewed on a case by case basis and some areas smaller areas may be appropriate for protection for other reasons. For example, they may have threatened flora or fauna, acts as a linkage between larger reserves, or have other conservation or socio-economic values or presence of an active Friends Group.

Table 8: Reserves ranked in order of Uninfested areas from largest to smallest with an indicative protectability time frame.

Rank	Reserve Name	Total Uninfested Protectable Area (ha)	Indicative Protectability Timeframe
1	Alps Street Reserve	43.34	Very Long Term
2	Pindalup Reserve	35.46	Very Long Term
3	Superblock inc prev. Wildflower Seed Reserve	30.03	Very Long Term
4	Quail Street Reserve	23.3	Long Term
5	Strettle Road Reserve	19.34	Long Term
6	Hovea Conservation Park	16.81	Long Term
7	Mathieson Road Transfer Station	14.1	Long Term
8	Falls Road Reserve	12.11	Long Term
9	North Darlington Reserve	10.39	Long Term
10	Railway Reserve Hovea - Chidlow	8.82	Medium Term
11	Black Cockatoo Reserves South	8.2	Medium Term
12	Binbrook Park	4.15	Medium Term
13	Black Cockatoo Reserves North	3.92	Medium Term
14	Southern Railway Heritage Trail Boya- Mundaring	3.29	Medium Term
15	Cameron Road Reserve	1.75	Medium Term
16	Beechina Railway Reserve	1.66	Short-Medium Term
17	Callan Road Reserve	1.62	Short-Medium Term
18	Sexton Street Reserve	1.44	Short-Medium Term
19	Rosedale Road Reserve	0.81	Short-Medium Term
20	Marloo Theatre Reserve	0.42	Short Term
21	Leschenaultia Park	0.39	Short Term
22	Hilltop Reserve	0.32	Short Term
23	Carawatha Reserve	0.31	Short Term
24	Glynden Reserve	0.2	Short Term
25	Thomas Street Reserve	0.08	Short Term
26	Roland Road Reserve	0.07	Short Term

Note: Protectability is indicative only and does not consider all factors.

4.7 Rehabilitation Trial Sites

The following 10 reserves have been identified as suitable locations to conduct rehabilitation trials using native species that are resistant or have low susceptibility to *P. cinnamomi*. Site suitability was based on criteria outlined in **Section 3.6**.

1. Alps Street Reserve
2. Superblock (including previous Wildflower Reserve)
3. Quail Street Reserve

4. Strettle Road Reserve
5. Hovea Conservation Park
6. Falls Road Reserve
7. North Darlington Reserves
8. Black Cockatoo (south)
9. Binbrook Reserve
10. Callan Road Reserve

Most of the ten reserves selected for rehabilitation trials also have the largest Uninfested Protectable areas. Pindalup Reserve and Mathieson Road Transfer station were not considered suitable as rehabilitation trial sites despite having large Uninfested Protectable areas (35.5 ha and 14.4 ha respectively). Pindalup Reserve is predominantly Uninfested and does not have sufficient area impacted by Dieback to warrant it being selected as a trial site. Mathieson Road Transfer Station has other issues in terms of safety and disturbance which makes it unsuitable as a rehabilitation trial site.

4.8 Dieback Signage

Dieback signage was outdated, vandalised or absent in the majority of these reserves. Of the 33 reserves assessed 18 require new or updated Dieback signage (**Table 9**). In some cases, when the Standard Protocol Dieback Signage was present, it was incorrectly located. It may have been correctly located initially, and the disease front has moved, so its location is no longer current.

Public vehicular access is a major vector in the spread of the Dieback pathogen, and this problem is compounded in reserves with inadequate signage. Firebreak maintenance activities requiring ground disturbance should also be planned, so they are undertaken in a manner that will minimise the risk of spreading Dieback. Standard Protocol Dieback Signage (Project Dieback 2009) should be installed in priority Protectable areas to inform reserve users of the risks of spreading Dieback.

5 Discussion

5.1 Dieback Occurrence within Shire of Mundaring Priority Bushland Reserves

Dieback was recorded in 31 of the 33 reserves assessed. Dieback was found to be widespread in the lower slopes, along drainage lines and water-gaining sites in 30 of the 33 reserves assessed. Infestations were also frequently mapped along access tracks, trails, firebreaks, old gravel pits and disturbed areas within the reserves. One reserve, Cookes Brook, was Uninterpretable but recorded a spot infestation at a positive sample.

Disease expression was variable throughout the assessment area, with disease symptoms being more obvious in the lower slopes and gullies, and more cryptic in mid and upper slope areas where the impact of drought and less active disease complicated interpretation.

Some reserves such as Alp Street and Quail Street have areas of very old Dieback (20-40 + years) where the impact of the disease on species diversity was being 'masked' by species such as *Bossiaea pulchella* which appears to have low susceptibility to the pathogen (**Photo 1-Appendix B: Quail Street Reserve**).

An infestation in the Superblock along Ryecroft Road was observed to be extremely active in 2017 but has become inactive after a buffer along the disease front was treated with phosphite in late 2018. Alps Street Reserve has the largest Uninfested Protectable area (43.3 ha). Infestations in Alps Street Reserve have been treated with phosphite, which has undoubtedly slowed the progression of the disease.

The Dieback occurrence estimates provided in the Priority Reserves Ecological Assessment Report 2018 (Terratree 2018) were generally supported by the comprehensive Dieback assessment. For example, the 2018 assessment of Quail Street Reserve estimated that the reserve was 85% Infested with "Very old infestation with mid-storey species missing and evidence of active disease as Dieback moves into mid and upper slope Uninfested remnants" (Terratree 2018). The 2019 Dieback assessment has determined that 77% of the reserve is Infested, but also that there are four Uninfested Protectable areas. Similarly, the 2018 assessment of Pindalup Reserve estimated that only 5% of the reserve was Infested, while the Dieback assessment confirmed that only a small area comprising 1% of the total reserve is Infested.

Dieback is likely significantly altering the reserves within the Shire in the following ways:

- Alteration of vegetative structure by removing keystone mid-story species and a large proportion of the shrub layer
- Significant reduction of species richness and cover and providing openings for weed species including *Watsonia* and Veldt Grass, which increase fuel loads and fire vulnerability
- Diminished foraging and nesting habitat for birds and small mammals through the removal of Proteaceous species including *Banksia grandis*, *B. sessilis* and *B. squarrosa*
- A reduction of canopy resulting in less interception of rainfall and therefore increased surface water run-off, erosion and further spread of Dieback.

Of the 33 reserves assessed 18 require new or updated Dieback signage. Dieback signage was outdated, vandalised or absent in the majority of these reserves. In some cases, when the Standard Protocol Dieback Signage was present, it was incorrectly located. It may have been correctly located initially, and the disease front has moved, so its location is no longer current.

Public vehicular access is a major vector in the spread of the Dieback pathogen, and this problem is compounded in reserves with inadequate signage. Firebreak maintenance activities requiring ground disturbance should also be planned, so they are undertaken in a manner that will minimise the risk of spreading Dieback. Standard Protocol Dieback Signage (Project Dieback 2009) should be installed in priority Protectable areas to inform reserve users of the risks of spreading Dieback.

The comprehensive Dieback occurrence mapping can be used for managing Dieback during operational activities through the application of appropriate hygiene management measures. The Protocol for Identifying

Protectable Areas (FEMD 2015) stipulates that Protectable areas 'are positioned in the landscape and are of sufficient size (e.g. >4 ha with axis >100 m) such that a qualified Interpreter judges that the pathogen will not autonomously engulf them in the short term (a period of a few decades). A 4ha minimum size has been adopted for Protectable areas within State Forest; however, with appropriate hygiene management the Shire could consider smaller areas as potentially protectable depending on their conservation attributes and landscape position in relation to Infested areas.

Individual reserve Dieback occurrence maps and data is included in **Appendix B**.

5.2 Other Potential Impacts to Vegetation

5.2.1 Drought

Impacts to vegetation through prolonged drought are distinguished from impacts caused by *P. cinnamomi* by the following characteristics:

- No disease pattern or chronology is seen in the surrounding vegetation.
- *Phytophthora*-resistant species are exhibiting evidence of stress and mortality.
- The plant died gradually, rather than quickly succumbing as is usually the case with deaths attributed to *P. cinnamomi*.
- No visible lesions or mycelium on the roots of the dead or dying plant. Re-shooting or epicormic growth is visible on dying plants.
- The presence of single or multiple dead branches with the remainder of the plant appearing to be healthy may be attributed to drought or pathogenic fungi.

Evidence of drought impacts was observable in rocky upper slope areas where species including *Banksia grandis* and *Macrozamia riedleii* had senesced during the summer month but had epicormic regrowth as a result of heavy winter rainfall. This was particularly evident in Quail Street, Falls Road, Hovea Conservation Park, Strettle Street and Black Cockatoo reserves.

5.2.2 Armillaria

Armillaria luteobubalina (Armillaria) or Australian Honey Fungus is a species of mushroom that causes Armillaria root-rot in affected plants. The fungus is widespread in Jarrah (*Eucalyptus marginata*) and Karri (*E. diversicolor*) forests of southwest Western Australia and has also been recorded in the south coast region in Fitzgerald River National Park. Armillaria is dispersed by spores produced by the mushroom and may also reproduce vegetatively through the roots of affected plants. It affects many of the same plant genera as *Phytophthora cinnamomi*, most notably members of the Myrtaceae and Proteaceae plant families including various *Eucalyptus* and *Banksia* species. Armillaria forms a visible white or yellow leathery mycelial sheath beneath the bark in the roots or lower stem. Other observable factors useful in the diagnosis of Armillaria infection include:

- clusters of fruiting bodies around or near the base of the plant
- a pungent mushroom smell
- an inverted V-shaped scar at the plant base
- yellow-white stringy rot under bark in the roots and base of affected plants (FEMD 2015).

Evidence indicating the presence of *Armillaria luteobubalina* was recorded during the assessment with fruiting bodies observed and mycelium on the roots of several samples that returned negative results for *P. cinnamomi*.

6 Conclusion and Recommendations

Dieback infestations were mapped in all Shire of Mundaring Priority Bushland Reserves assessed, except for Cookes Brooke, Marriott Park and Milligan Road Reserve. In these three reserves, the vegetation was classified as uninterpretable due to a lack of susceptible species and/or excluded from dieback assessment due to the degraded condition of the vegetation. For all other reserves assessed, established protocols were applied in determining Uninfested areas that are Protectable from Dieback in the medium to long term.

A total of nine reserves were identified as having Uninfested areas which meet protectability criteria to be Protectable from Dieback infestation in the long-term to very long-term (50 to over 100 years). They are:

- Alps Street Reserve
- Pindalup Reserve
- Superblock inc prev. Wildflower Seed Reserve
- Quail Street Reserve
- Strettle Road Reserve
- Hovea Conservation Park
- Mathieson Road Transfer Station
- Falls Road Reserve
- North Darlington Reserve

A further six had uninfested areas which were determined to be protectable in the medium-term (20 to 50 years). These are:

- Railway Reserve Hovea - Chidlow
- Black Cockatoo Reserves South
- Binbrook Park
- Black Cockatoo Reserves North
- Southern Railway Heritage Trail Boya- Mundaring
- Cameron Road Reserve

Uninfested areas in four reserves were considered protectable in the short to medium term. While these areas are larger than 0.5ha, they have a small axis and or landscape positions relative to Dieback which put them at risk. These are:

- Beechina Railway Reserve
- Callan Road Reserve
- Sexton Street Reserve
- Rosedale Road Reserve

Uninfested areas in the seven other reserves were considered Unprotectable. These areas are only protectable in the short-term (less than 20 years).

Protectability status should be reviewed on a case by case basis and some areas smaller areas may be appropriate for protection for other reasons. For example, they may have threatened flora or fauna, acts as a linkage between larger reserves, or have other conservation or socio-economic values or presence of an active Friends Group. It is recommended that the 2018 Priority Reserves list (as determined by the Terratree 2018 Ecological Assessment) be revised to take into account reserve Protectability status.

Phosphite treatment should be applied to a 10 -15m Uninfested buffer along active disease edges in priority reserves with Uninfested Protectable areas over 4ha in size. Photo monitoring points directed at the active disease edge should then be immediately established to monitor disease activity on an annual basis.

Reserves with Uninfested Protectable areas should also have vehicle and pedestrian access reviewed and corrected as necessary to prevent Dieback spread. Standard Protocol Dieback Signage (Project Dieback 2009) should be installed in priority Protectable areas to inform reserve users of the risks of spreading Dieback.

Reserves where Uninfested areas are Unprotectable will benefit from revegetating Infested and Excluded (Degraded) areas with Dieback-resistant and low-susceptibility species. Revegetating areas that are Infested or Degraded will have the following benefits:

- Restoration of ecological function in terms of habitat for birds, small mammals and invertebrates
- Inhibition of weed invasion
- Reduce the risk of soil erosion from reduced biomass
- Improvement of visual amenity
- Empowerment of Friends groups to actively rehabilitate areas affected by Dieback and other threatening processes, thus improving biodiversity conservation and visual amenity.

Flora surveys should be conducted across disease fronts in different soil and vegetation types to determine appropriate species to use in rehabilitation trials. Surveys can help determine the most suitable species for use in rehabilitating Infested and Degraded areas within the reserves where this is recommended.

Detailed recommendations for individual reserves are included in **Appendix B**.

Table 9 provides a summarised list of recommendations for management actions and/or research for each reserve, including the following:

- Treatment: Treat buffer at the interface of Infested and Uninfested Protectable areas with phosphite.
- Monitoring: Establish annual photo monitoring points for areas treated with phosphite.
- Access Management: Review and update management protocols for vehicle and machinery access to the reserves.
- Signage: Review Dieback signage in the reserves to ensure they are correctly placed and adequate.
- Flora Survey: Undertake baseline flora surveys to quantify species richness and cover along transects through Infested to Uninfested areas in different soil and vegetation types in priority reserves to inform species selection for rehabilitation trials.
- Rehabilitation Trials: Establish rehabilitation trial plots in different soil and vegetation types.
- Revegetation: Revegetate Excluded (Degraded) areas with resistant species or species that have low susceptibility to *P. cinnamomi* infection.

The Dieback Interpreter's Manual requires a Comprehensive Dieback assessment be repeated every three years where ground disturbance activities are planned (FEMD 2015). Recheck assessments involving checking whether the Infested area boundary has spread can be completed annually for up to three years to update Dieback occurrence maps. While this only applies to DBCA-managed lands, it is best practice, and Terratree recommends that all land managers follow this guidance where ground disturbance activities (e.g. firebreak construction, trail construction, drainage works) are planned in areas of native vegetation, particularly in areas where infestations are known to occur.

Table 9: Management and research recommendations for Priority Bushland Reserves

Reserve Name	Treat ment	Photo Point Monitoring	Access Management	Signage	Flora Survey	Rehabilitation Trails	Revege tation
Alps St Reserve	X	X	X	X	X	X	
Beechina Rail Reserve	X	X		X			
Binbrook Park	X	X		X	X	X	

Reserve Name	Treat ment	Photo Point Monitoring	Access Management	Signage	Flora Survey	Rehabilitation Trails	Revege tation
Black Cockatoo Reserves (north)	X	X	X	X	X	X	
Black Cockatoo Reserves (south)	X	X		X		X	
Callan Road Reserve	X	X	X			X	
Cameron Road Reserve	X	X					X
Carawatha Road Reserve				X			
Chidlow Oval	X	X	X	X			
Cookes Brook							
Falls Road Reserve	X	X	X	X	X	X	
Gilfellow Reserve				X			
Glynden Reserve							X
Hilltop Reserve				X			
Hovea Conservation Park	X	X	X	X	X	X	
Jane Byfield Reserve			X				X
Leschenaultia Park	X	X	X				X
Marloo Theatre Reserve							X
Marriott Park							X
Mathieson Road Transfer Station	X	X	X			X	
Milligan Road Reserve			X				X
North Darlington Reserves (incl. Nan Macmillan Reserve)	X	X	X	X		X	
Old Parkerville School Site			X				X
Pindalup Reserve	X	X	X	X			
Quail Street Reserve	X	X	X	X	X	X	
Railway Reserve, Hovea - Chidlow	X	X					X
Roland Road Reserve	X	X					
Rosedale Road Reserve	X	X	X	X			
Sexton Street Reserve	X	X		X			
Southern Railway Heritage Trail, Boya - Mundaring	X	X					X
Strettle Road Reserve	X	X	X	X	X	X	
Superblock (incl. previous wildflower seed reserve)	X	X	X	X	X	X	
Thomas Street Reserve							X

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8 Glossary of Terms (adapted from FEMD 2015)

Assessment - (Phytophthora occurrence) any combination of activities including detection, diagnosis (interpretation), mapping and demarcation of Phytophthora Dieback disease in natural ecosystems.

Assessment Area - an area where Phytophthora occurrence assessment is possible or will be possible in the short to medium term. This area may be larger or smaller than the proponent's project area.

Axis – The width of the reserve at its narrowest point.

Chlorosis - a condition in which leaves produce insufficient chlorophyll.

Diagnosis - a determining or analysis of the cause or nature of a problem or situation.

Dieback (Phytophthora) - in the south-west of Western Australia, a disease of plants caused by infection by the soil-borne organisms of the genus *Phytophthora*, of which *P. cinnamomi* is the most widespread.

Dieback (Phytophthora) Interpreter - a registered person who conducts Phytophthora Dieback interpretation.

Dieback (Phytophthora) Interpretation - the method of determining Phytophthora Dieback infestation using procedures in the Dieback Interpreter's Manual (Forest and Ecosystem Management Division (2015). FEM047 Phytophthora Dieback Interpreter's manual for lands managed by the department. Version 1.0. Department of Parks and Wildlife, Perth, Western Australia).

Disease - the combination of a pathogen, host and correct environmental conditions, which results in disease symptoms or death of a host.

Environment - the sum of all external factors that act on an individual organism during its lifetime.

Excluded Area - an area that has been disturbed to an extent that it is not assessable and therefore excluded from Dieback interpretation.

Host - the plant that is invaded by a pathogen and from which the pathogen derives its energy.

Indicator species – a plant species that is more susceptible to Phytophthora disease and reliably shows symptoms earlier than other species.

Infection - the invasion of a host organism's bodily tissue by disease-causing organisms. In relation to Dieback, this refers to an individual plant and not the population.

Infested Area - an area that an accredited Dieback Interpreter has determined has plant disease symptoms consistent with the presence of the pathogen *Phytophthora*.

Inoculum - cells, tissue, or viruses that are used to inoculate a new culture.

Not Yet Resolved - an area that is interpretable for Dieback but where a determination regarding the disease status cannot be made due to a lack of evidence in the form of positive sample results.

Pathogen - any organism or factor causing disease within a host.

Pathogenic - causing or capable of causing disease.

Phytophthora Dieback - a term referring to the disease symptoms caused by *Phytophthora* species in susceptible vegetation.

Protectable Area - an area of land managed by the landowner where hygiene management rules for the plant pathogen *Phytophthora*, including clean on entry, will apply. These areas are generally free of disease.

Susceptible - influenced or able to be harmed by Phytophthora Dieback.

Standard Protocol Dieback Signage – A standardised signage system developed for all land tenures, aiming to raise dieback awareness and assist land managers, operational staff and contractors involved in earthworks to minimise the risk of spreading existing infestations and protecting areas still free from Dieback.

Sporulation - a type of reproduction that occurs in fungi, algae and protozoa and involves the formation of spores by the spontaneous division of a cell into four or more daughter cells, each of which contains a part of the original nucleus.

Symptom - a phenomenon that arises from and accompanies a particular disease or disorder and serves as an indication of it.

Uninfested Area - an area that an accredited Dieback Interpreter has determined to be free of plant disease symptoms that indicate the presence of Phytophthora Dieback.

Uninterpretable Area - an area situated in locations receiving >600 mm rainfall per year or are water-gaining sites (e.g. granite outcrops, impeded drainage or engineering works that aggregate rainfall) in the 400-600 mm per year rainfall zone where indicator plants are absent or too few to determine the presence or absence of disease caused by Phytophthora Dieback.

Unprotectable Area - a disease-free area that is likely to become infested within a given time.

Vector - any agent that acts as a carrier or transporter.

Appendices

8.1 Appendix A: Vegetation complexes within the assessment area

Vegetation Complex	Dwellingup (D2)
Geographic Region	Subhumid North, East of Armadale and Jarrahdale
Landform Description	Upland ridges and spurs within mildly undulating northern Darling Plateau
Soils	Pale yellow to red brown gravelly sands and sandy loams, with frequent lateritic ironstone outcrops
Soil Hydrology	Mildly water shedding via subsoil, good infiltration and storage capacity (as deep profile)
Overstorey	Open Forest of <i>Eucalyptus marginata</i> subsp. <i>marginata</i> and <i>Corymbia calophylla</i>
Second Storey	<i>Allocasuarina fraseriana</i> and <i>Banksia grandis</i>
Shrubs and Herbs	<i>Adenanthos barbigier</i> , <i>Hovea chorizemifolia</i> , <i>Hakea lissocarpha</i> , <i>Leucopogon capitellatus</i> , <i>Leucopogon propinquus</i> , <i>Macrozamia riedlei</i> , <i>Styphelia tenuiflora</i> and <i>Patersonia rudis</i> subsp. <i>rudis</i>
Interpretability for Dieback Assessment	Medium to High interpretability
Reserves with Dominant Presence of this Complex	Black Cockatoo Reserves (mid), Cameron Road Reserve, Hovea Conservation Park, Mathieson Street Transfer Station, Milligan Road Reserve, North Darlington Reserves (incl. Nan Macmillan Reserve), Roland Road Reserve, Sexton Street Reserve, Southern Railway Heritage Trail, Strettle Road Reserve, Superblock
Reserves with Minor Presence of this Complex	Alps Street Reserve, Black Cockatoo Reserves (north), Callan Road Reserve, Carawatha Road Reserve, Falls Road Reserve, Railway Reserve - Hovea to Chidlow, Quail Street Reserve
Vegetation Complex	Murray 2 (My2)
Geographic Region	Semiarid North near Gidgegannup and Semiarid North, South East of Mundaring
Landform Description	Low slopes of a major valley moderately deeply incised into the Darling Plateau. Slopes of a major valley moderately deeply incised into the Darling Plateau.
Soils	Brown sandy loam to loam and Dark brown gravelly loams over red brown loamy clay, occasional granitic or doleritic outcrop
Soil Hydrology	Strongly water shedding with moderate infiltration but limited storage capacity. Water gaining, seasonally flooded but with good lateral drainage capacity.
Overstorey	Low Forest of <i>Eucalyptus rudis</i> and <i>Melaleuca raphiophylla</i> on floor, <i>Eucalyptus patens</i> and <i>Corymbia calophylla</i> open forest on slopes. Woodland of <i>Eucalyptus wandoo</i> with some <i>Corymbia calophylla</i>
Second Storey	No second storey
Shrubs and Herbs	<i>Lepidosperma tetraquetrum</i> , <i>Lepidosperma squamatum</i> , <i>Hypocalymma angustifolium</i> , <i>Astartea fascicularis</i> , <i>Trymalium floribundum</i> and <i>Xanthorrhoea preissii</i> . <i>Hakea lissocarpha</i> , <i>Macrozamia riedlei</i> , <i>Acacia pulchella</i> , <i>Baeckea camphorosmae</i> , <i>Hypocalymma angustifolium</i> , <i>Hibbertia commutata</i> , <i>Leucopogon capitellatus</i> and <i>Trymalium ledifolium</i> .
Interpretability for Dieback Assessment	Low interpretability
Reserves with Dominant Presence of this Complex	Beechina Rail Reserve, Binbrook Park, Callan Road Reserve, Carawatha Road Reserve, Cookes Brook, Falls Road Reserve, Old Parkerville School Site, Railway Reserve – Hovea to Chidlow, Quail Street Reserve
Reserves with Minor Presence of this Complex	Gilfellon Reserve, Hovea Conservation Park, North Darlington Reserves (incl. Nan Macmillan Reserve), Pindalup Reserve, Southern Railway Heritage Trail, Superblock

Vegetation Complex	Yarragil 1 (Yg1)
Geographic Region	Subhumid North, East of Armadale and Jarrahdale
Landform Description	Slopes of a minor valley moderately incised into the northern Darling Plateau
Soils	Pale yellow brown gravelly sands, with occasional ironstone outcrop
Soil Hydrology	Mildly water shedding, with good infiltration and storage capacity
Overstorey	Open Forest of <i>Eucalyptus marginata</i> subsp. <i>marginata</i> with some <i>Corymbia calophylla</i>
Second Storey	Strong development of <i>Allocasuarina fraseriana</i> and <i>Banksia grandis</i>
Shrubs and Herbs	<i>Grevillea wilsonii</i> , <i>Styphelia tenuiflora</i> , <i>Adenanthos barbiger</i> , <i>Hovea chorizemifolia</i> , <i>Patersonia rudis</i> subsp. <i>rudis</i> , <i>Lepidosperma squamatum</i> , <i>Lechenaultia biloba</i> and <i>Hakea ruscifolia</i>
Interpretability for Dieback Assessment	Medium to High interpretability
Reserves with Dominant Presence of this Complex	Alps Street Reserve, Black Cockatoo Reserves (north), Gilfellon Reserve, Hilltop Reserve, Jane Byfield Reserve, Southern Railway Heritage Trail, Thomas Street Reserve
Reserves with Minor Presence of this Complex	Hovea Conservation Park, Quail Street Reserve, Railway Reserve – Hovea to Chidlow, Sexton Street Reserve, Strettle Road Reserve
Vegetation Complex	Pindalup (Pn)
Geographic Region	Perarid North, West of York
Landform Description	Slopes of a minor valley within the Darling Plateau
Soils	Pale brown sandy loam over clay
Soil Hydrology	Mildly water shedding, with moderate infiltration but limited storage capacity
Overstorey	Woodland of <i>Eucalyptus wandoo</i>
Second Storey	No second storey
Shrubs and Herbs	<i>Hakea incrassata</i> , <i>Hakea lissocarpha</i> , <i>Caustis dioica</i> , <i>Gastrolobium calycinum</i> , <i>Neurachne alopecuroidea</i> , <i>Centrolepis cephaloformis</i> , <i>Persoonia quinquenervis</i> and <i>Lechenaultia biloba</i>
Interpretability for Dieback Assessment	Low interpretability
Reserves with Dominant Presence of this Complex	Leschenaultia Park, Rosedale Road Reserve
Reserves with Minor Presence of this Complex	Beechina Rail Reserve, Cookes Brook, Mathieson Street Transfer Station, Railway Reserve – Hovea to Chidlow, Pindalup Reserve
Vegetation Complex	Dwellingup (D4)
Geographic Region	Semiarid North, South East of Mundaring
Landform Description	Margin of the Darling Plateau next to a major river dissection
Soils	Yellow brown gravelly sandy loam over pale sandy clay at depth; some lateritic outcrop
Soil Hydrology	Mildly water shedding via subsoil, good infiltration and storage capacity
Overstorey	Woodland to Open Forest of <i>Eucalyptus marginata</i> subsp. <i>thalassica</i> and <i>Corymbia calophylla</i>
Second Storey	No second storey
Shrubs and Herbs	<i>Hakea lissocarpha</i> , <i>Phyllanthus calycinus</i> , <i>Macrozamia riedlei</i> , <i>Leucopogon capitellatus</i> , <i>Leucopogon propinquus</i> , <i>Patersonia rudis</i> subsp. <i>rudis</i> and <i>Styphelia tenuiflora</i>
Interpretability for Dieback Assessment	Low interpretability
Reserves with Dominant Presence of this Complex	Chidlow Oval, Pindalup Reserve
Reserves with Minor Presence of this Complex	Mathieson Street Transfer Station, Railway Reserve – Hovea to Chidlow, Rosedale Road Reserve

Vegetation Complex	Darling Scarp (DS2)
Geographic Region	Subhumid North, South of Armadale
Landform Description	Steeply sloping western edge of the Darling Plateau
Soils	Bare rock, skeletal soils and shallow gritty sandy loam on milder slopes
Soil Hydrology	Very strongly water shedding with limited infiltration and storage capacity
Overstorey	Open Woodland of <i>Corymbia calophylla</i> , <i>Eucalyptus laeliae</i> , <i>Eucalyptus wandoo</i> and <i>Allocasuarina huegeliana</i>
Second Storey	Grading into Heath, Herbland and Lithic Complex on exposed rock due to steepness of slope and depth of soil
Shrubs and Herbs	<i>Hakea undulata</i> , <i>Hakea lissocarpha</i> , <i>Grevillea bipinnatifida</i> , <i>Cheilanthes austrotenuifolia</i> , <i>Borya sphaerocephala</i> and <i>Trymalium ledifolium</i>
Interpretability for Dieback Assessment	Low interpretability
Reserves with Dominant Presence of this Complex	Marloo Theatre Reserve, Marriot Park
Reserves with Minor Presence of this Complex	North Darlington Reserves (incl. Nan Macmillan Reserve), Southern Railway Heritage Trail
Vegetation Complex	Forrestfield (Fo)
Geographic Region	Subhumid North, South of Armadale
Landform Description	Mildly undulating shelf and spurs at the foot of Darling Scarp
Soils	Yellow brown gravelly sands
Soil Hydrology	Mildly water shedding via subsoil, with good infiltration and storage capacity
Overstorey	Woodland of <i>Eucalyptus marginata</i> subsp. <i>marginata</i> with some <i>Corymbia calophylla</i>
Second Storey	<i>Allocasuarina fraseriana</i> , <i>Banksia grandis</i> , <i>Banksia attenuata</i> , <i>Banksia menziesii</i> and <i>Xylomelum occidentale</i>
Shrubs and Herbs	<i>Mesomelaena stygia</i> , <i>Hakea ruscifolia</i> , <i>Hibbertia hypericoides</i> , <i>Stirlingia latifolia</i> , <i>Conospermum stoechadis</i> , <i>Macrozamia riedlei</i> , <i>Dryandra sessilis</i> var. <i>sessilis</i> and <i>Xanthorrhoea preissii</i>
Interpretability for Dieback Assessment	High interpretability
Reserves with Dominant Presence of this Complex	Glynden Reserve
Reserves with Minor Presence of this Complex	Marloo Theatre Reserve, Marriot Park, Southern Railway Heritage Trail
Vegetation Complex	Cooke (Ce)
Geographic Region	Semiarid North, Southeast of Jarrahdale
Landform Description	Mild midslope between valley and uplands
Soils	Humus podzol with humus enriched topsoil, over bleached sandy clay
Soil Hydrology	Mildly watershedding with good infiltration but only moderate storage capacity; impeded lateral and internal drainage
Overstorey	Low Woodland of <i>Eucalyptus marginata</i> subsp. <i>marginata</i> and <i>Corymbia calophylla</i>
Second Storey	No second storey
Shrubs and Herbs	<i>Xanthorrhoea preissii</i> , <i>Hovea elliptica</i> , <i>Lindsaea linearis</i> , <i>Podocarpus drouynianus</i> , <i>Anarthria scabra</i> , <i>Anarthria prolifera</i> and <i>Leucopogon verticillatus</i>
Interpretability for Dieback Assessment	Medium interpretability
Reserves with Dominant Presence of this Complex	None
Reserves with Minor Presence of this Complex	Southern Railway Heritage Trail

8.2 Appendix B: Individual Reserves Results, Comments and Recommendations

Alps Street Reserve

Reserve #: 34103
2018 Priority: 1
2019 Ranking: 1
Area: 52.5 ha

Historic Dieback Information

The 2017 Broadscale assessment estimated reported that there are “significant infestations in NE of reserve and along perimeter tracks” (Terratree Pty Ltd 2018).

Dieback Occurrence: Approximately 20 % Infested

Three samples confirmed the presence of *Phytophthora cinnamomi* in the reserve. *P. multivora* was identified from sample SOM19S58.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Infested	10.85	19.64
Uninfested	43.34	78.44
Uninterpretable	1.06	1.92
Total	55.25	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S56	<i>Banksia sessilis</i> & <i>Xanthorrhoea gracilis</i>	425107	6471858	<i>P. cinnamomi</i>	N/A
SOM19S57	<i>Banksia sessilis</i> & <i>Xanthorrhoea gracilis</i>	425239	6472182	<i>P. cinnamomi</i>	N/A
SOM19S58	<i>Banksia grandis</i>	425502	6471626	<i>P. multivora</i>	N/A
SOM19S59	<i>Banksia sessilis</i> & <i>Xanthorrhoea gracilis</i>	425473	6471413	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

- There is no Standard Protocol Dieback Signage in this reserve and public vehicular access is a significant hygiene issue.

Recommended Management and Research Actions

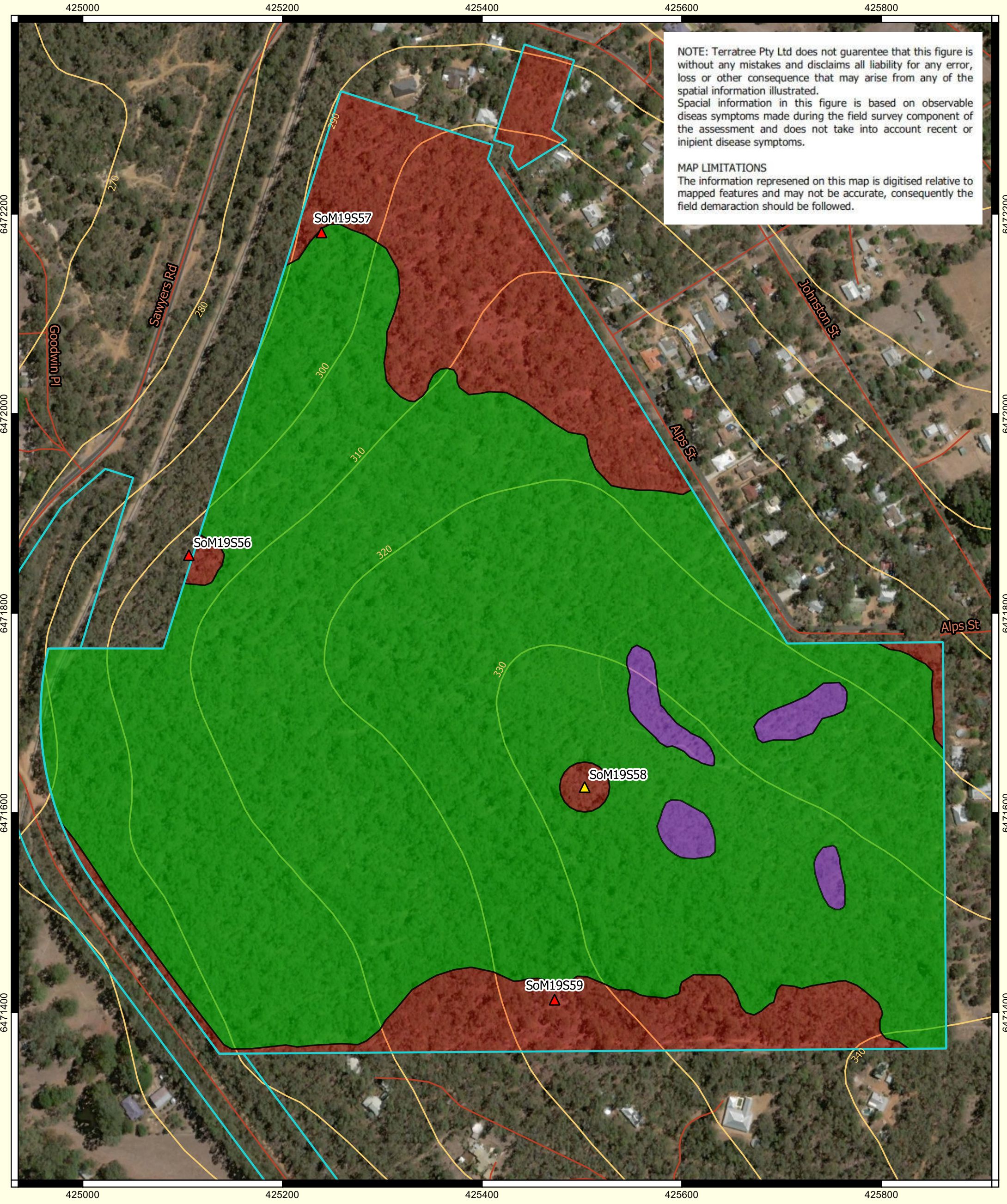
1. Undertake baseline flora surveys to quantify species richness and cover, along transects going from Infested to Uninfested in different soil and vegetation types in the reserve, to inform species selection for rehabilitation trails.
2. Establish rehabilitation trial plot(s).
3. Establish photo monitoring points for areas treated with phosphite.
4. Install Standard Protocol Dieback Signage.



Photo 1: Uninfested vegetation within Alps Street Reserve



Photo 2: Infested vegetation within Alps Street Reserve



NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated. Spatial information in this figure is based on observable dieback symptoms made during the field survey component of the assessment and does not take into account recent or inipient dieback symptoms.

MAP LIMITATIONS
The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demarcation should be followed.

Legend

Assessment Area

Contours

Roads

Dieback Occurrence

Infested

Uninfested

Uninterpretable

Sample Locations and Results

Positive: *P. cinnamomi*

Positive: *P. multivora*

Project Location

Dieback Occurrence Map - Alps Street Shire of Mundaring Priority Reserves Dieback Assessment 2019

0

100

200 m

N

Datum: GDA 1994
Projection: MGA Zone 50

Scale: 1: 3500 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project No: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Revision: H. Legge	
	Review:	

Figure 1

Beechina Rail Reserve

Reserve #: 35397

2018 Priority: 31

2019 Ranking: 16

Area: 6.7 ha

Historic Dieback Information

Previous Broadscale assessment suggested there is likely to be Uninfested areas that are protectable and therefore a Comprehensive Dieback assessment of these area is required.

Dieback Occurrence: Approximately 46 % Infested

One sample confirmed the presence of *Phytophthora cinnamomi* in the, but 1.59 ha (25%) remains Uninfested and Protectable.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	0.86	12.9
Infested	3.04	45.5
Uninfested	1.66	24.9
Uninfested Unprotectable	0.53	7.9
Uninterpretable	0.59	8.8
Total	6.68	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S09	<i>Xanthorrhoea preissii</i>	435605	6474218	<i>P. cinnamomi</i>	N/A
SOM19S10	<i>Banksia squarrosa</i>	435628	6473746	Negative	N/A

Other Comments/Issues

- Littering is an issue at the bus shelter.
- Large Blackberry population plus Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) and Tagasaste, which require treatment.

Recommended Management Actions

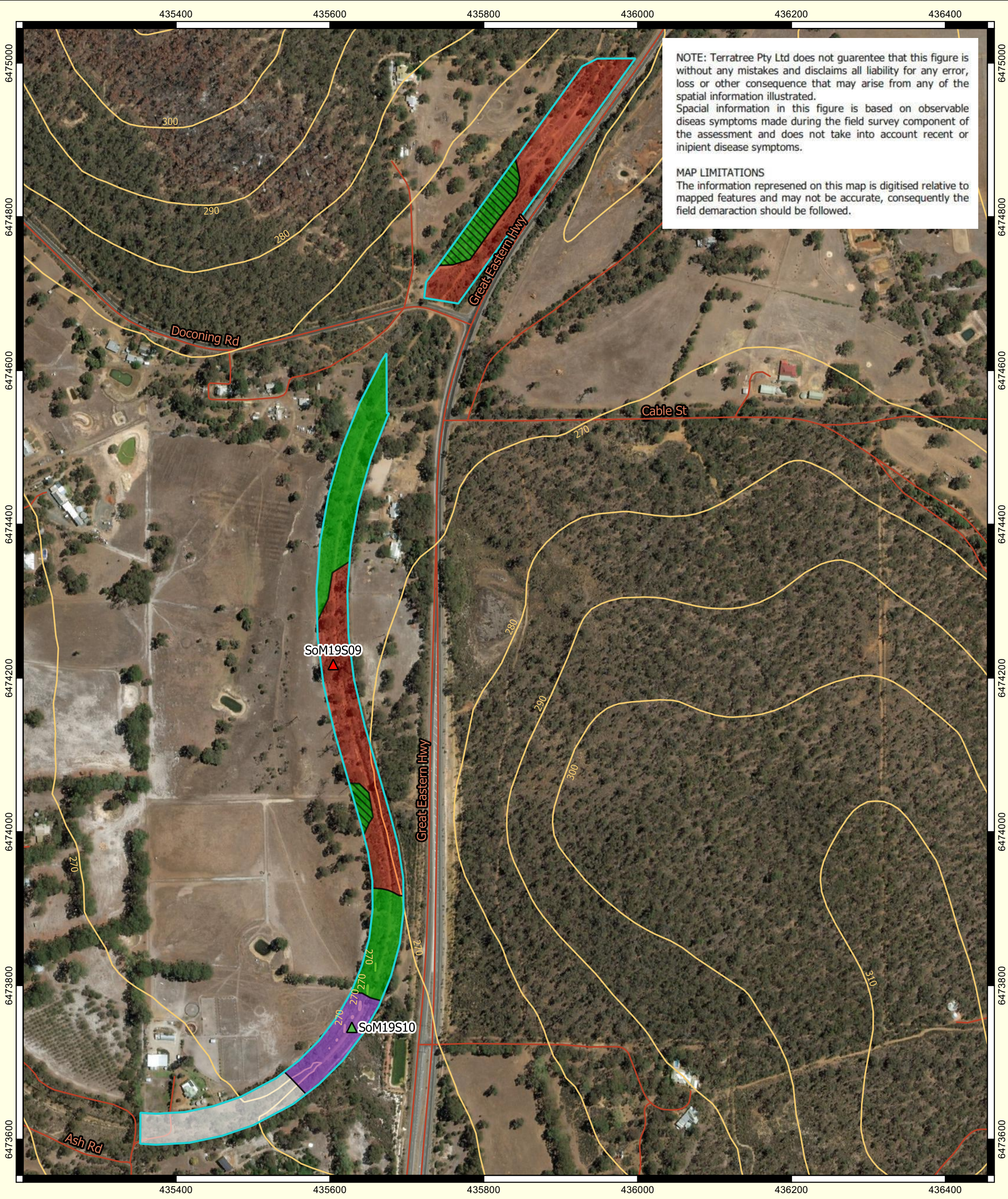
1. Treat Uninfested Protectable area with phosphite.
2. Install Standard Protocol Dieback Signage.



Photo 1: Uninfested vegetation in Beechina Rail Reserve



Photo 2: Infested vegetation in Beechina Rail Reserve



Legend

- Assessment Area
- Contours
- Roads

Sample Locations and Results

- Positive: *P. cinnamomi*
- Negative

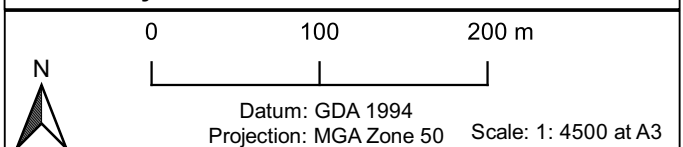
Dieback Occurrence

- Excluded
- Infested
- Uninfested
- Uninfested Unprotectable
- Uninterpretable



Project Location

Dieback Occurrence Map Beechina Rail Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019



Date: 24/11/2020	Prepared: A. Caubo	Project No: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Revision: H. Legge	
	Review:	

Figure 2

Terratree

Binbrook Park

Reserve #: 1847

2018 Priority: 11

2019 Ranking: 12

Area: 7.5ha

Historic Dieback Information

The 2017 Broadscale assessment reported that “Dieback widespread in eastern portion of the reserve” (Terratree Pty Ltd 2018).

One historical positive sample for *Phytophthora cinnamomi* from 2004 within western boundary.

Dieback Occurrence: Approximately 34 % Infested

Two samples confirmed the presence of *P. cinnamomi* in the reserve, however approximately 55 % (4.15ha) remains Uninfested.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	0.1	1.34
Infested	2.56	34.32
Uninfested	4.15	55.63
Uninterpretable	0.65	8.71
Total	7.46	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S62	<i>Xanthorrhoea gracilis</i>	413400	6468579	<i>P. cinnamomi</i>	N/A
SOM19S63	<i>Xanthorrhoea gracilis</i>	413393	6468368	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

Nil

Recommended Management and Research Actions

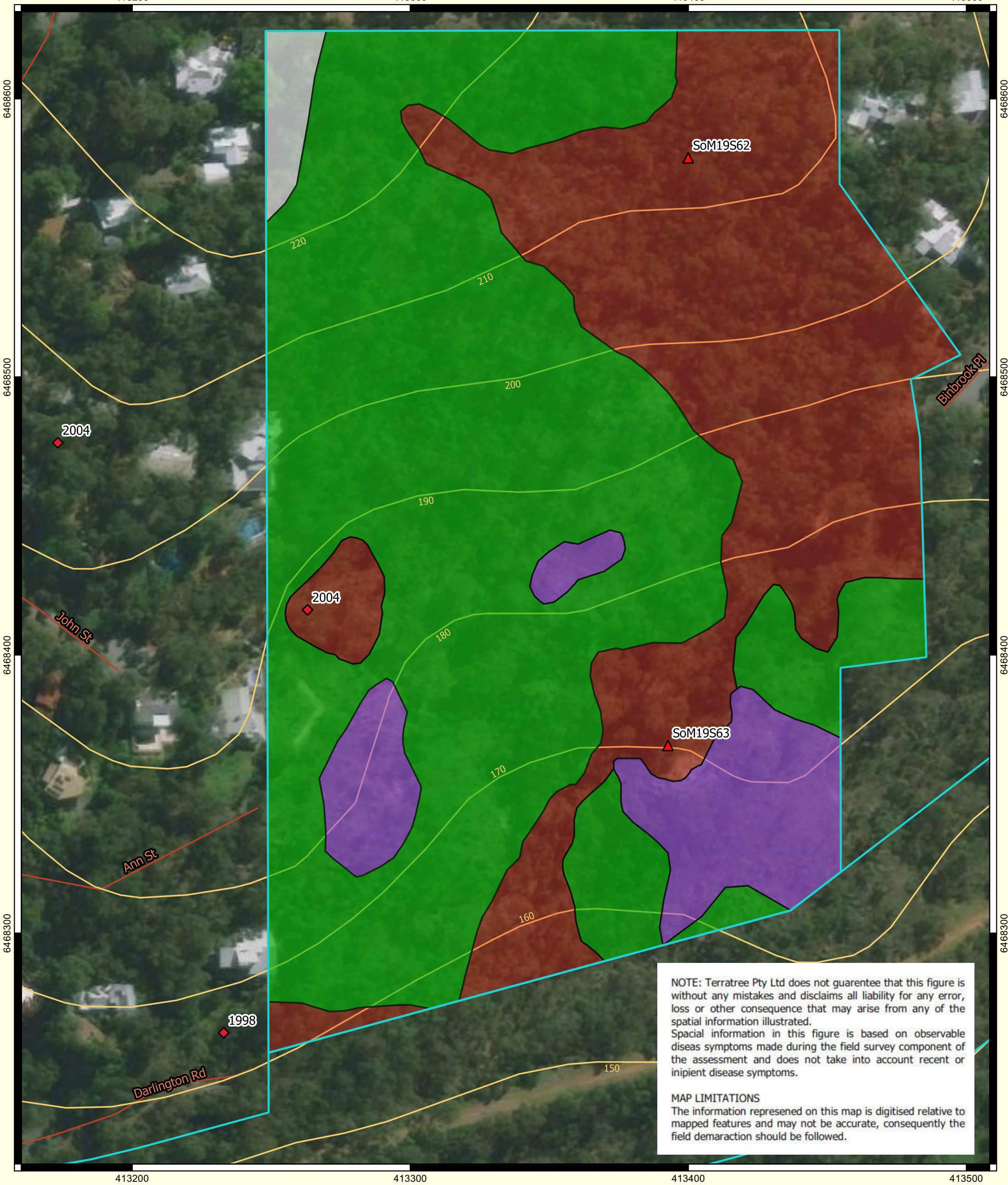
1. Treat buffer at the interface of Infested and Uninfested with phosphite.
2. Undertake baseline flora surveys to quantify species richness and cover, along transects going from Infested to Uninfested in different soil and vegetation types in the reserve, to inform species selection for rehabilitation trails.
3. Establish rehabilitation trial plot(s).
4. Install Standard Protocol Dieback Signage.



Photo 1: Uninfested vegetation in Binbrook Park



Photo 2: *Xanthorrhoea gracilis* infected with *P. cinnamomi*



Legend

- Assessment Area
- Contours
- Roads

Sample Locations

- Positive: *P. cinnamomi*
- Historical Positive

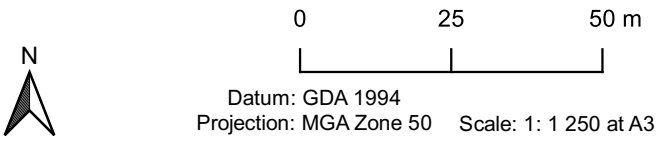
Dieback Occurrence

- Excluded
- Infested
- Uninfested
- Uninterpretable



Project Location

Dieback Occurrence Map
Binbrook Park
Shire of Mundaring
Priority Reserves Dieback Assessment 2019



Date: 24/11/2020	Prepared: A. Caubo	Project No: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Revision: H. Legge	
	Review:	

Figure 3



Black Cockatoo Reserves (north)

Reserve #: 20990

2018 Priority: 6

2019 Ranking: 13

Area: 13.0 ha

Historic Dieback Information

The 2017 Broadscale Dieback assessment classified 70 % of the area as Infested with Dieback, stating “only the upper slope area along the western boundary and north-western corner remains Dieback free.” Dieback Treatment Services have previously mapped and treated Dieback in this reserve (Terratree Pty Ltd 2018).

Dieback Occurrence: Approximately 70 % Infested

Sample SOM19S01 in the north-western portion of the reserve returned a positive result for *P. cinnamomi*, which increased the infested area from previous mapping undertaken by Dieback Treatment Services.

The main Uninfested area is located in the northern portion of the reserve with a small Uninfested strip along the western boundary.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Infested	9.09	69.9
Uninfested	3.92	30.1
Total	13.01	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S01	<i>Xanthorrhoea preissii</i>	422447	6471466	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

Standard Dieback Protocol Signage present but some signs vandalised and located in the wrong place.

Recommended Management and Research Actions

1. Undertake baseline flora surveys to quantify species richness and cover, along transects going from Infested to Uninfested in different soil and vegetation types in the reserve, to inform species selection for rehabilitation trails.
2. Establish rehabilitation trial plot(s).
3. Establish photo monitoring points for area treated with phosphite.
4. Review location of Standard Protocol Dieback Signage and replace vandalised signs.



Photo 1: Infested vegetation at Black Cockatoo Reserves (north)



Photo 2: *Xanthorrhoea gracilis* infected with *P. cinnamomi* at Black Cockatoo Reserves (north)



NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated. Spatial information in this figure is based on observable dieback symptoms made during the field survey component of the assessment and does not take into account recent or inipient disease symptoms.

MAP LIMITATIONS
The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demaraction should be followed.

Legend

Assessment Area

Contours

Roads

Dieback Occurrence

Infested

Uninfested

Sample Locations and Results

Positive: *P. cinnamomi*

Project Location

Dieback Occurrence Map

Black Cockatoo Reserve (North)

Shire of Mundaring

Priority Reserves Dieback Assessment 2019

02550 m

Datum: GDA 1994
Projection: MGA Zone 50

Scale: 1: 1750 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project No: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Revision: H. Legge	
	Review:	

Figure 4

Black Cockatoo Reserves (south)

Reserve #: 12422
2018 Priority: 7
2019 Ranking: 11
Area: 18.5 ha

Historic Dieback Information

A positive sample for *Phytophthora cinnamomi* from 2014 was identified from the DIDMS database in the south-eastern corner of Black Cockatoo Reserves (south).

Dieback Occurrence: Approximately 54 % Infested

A large portion (46%) of this reserve is Uninfested. There is a large Uninfested Protectable area in the centre of the reserve, and only a small part of the reserve is Uninfested Unprotectable (1.8%) due to being surrounded and/or down slope of Infested areas. The largest infestation is along the western and northern portion of the reserve with a narrower infestation along the entire eastern boundary. A small Infested area was mapped adjacent to the water treatment plant north of the Mundaring Christian College.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Infested	9.98	53.9
Uninfested	8.2	44.3
Uninfested Unprotectable	0.33	1.8
Total	18.51	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S02	<i>Banksia grandis</i>	422547	6470794	Negative	Negative
SOM19S03	<i>Banksia grandis</i>	422538	6470623	Negative	N/A
SOM19S04	<i>Banksia grandis</i>	422493	6470875	Negative	Negative

Other Comments/Issues

Standard Dieback Protocol Signage present but sometimes in the wrong place.

Recommended Management Actions

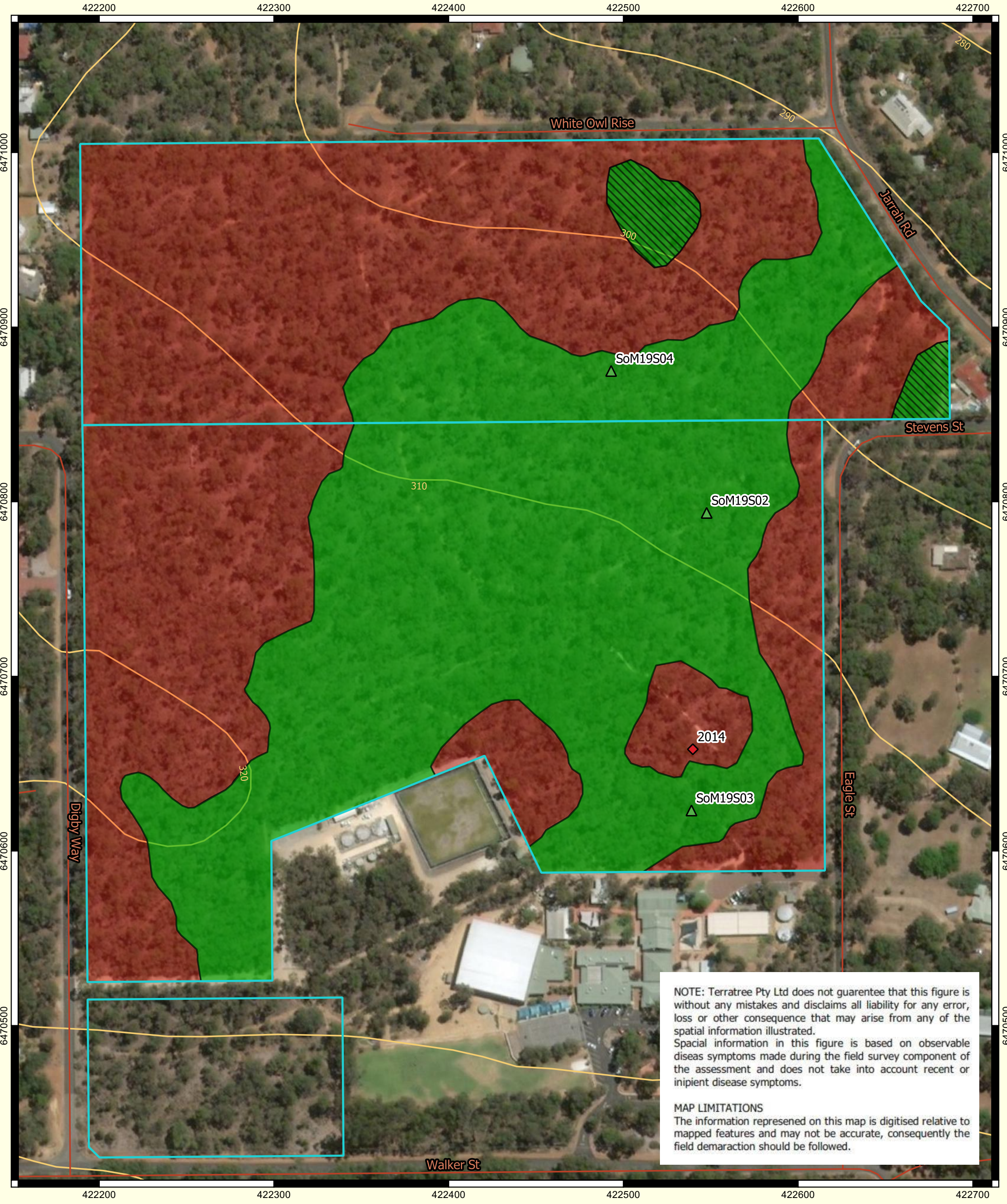
1. Establish rehabilitation trial plot(s)
2. Establish photo monitoring points for area treated with phosphite.
3. Review location of Standard Protocol Dieback Signage and replace vandalised signs.



Photo 1: Uninfested Protectable vegetation in Black Cockatoo Reserves (south)



Photo 2: Signage at Black Cockatoo Reserves (south), some of which has been vandalised and is incorrectly positioned



Legend

- Assessment Area
- Contours
- Roads

Sample Locations and Results

- Negative
- Historical Positive

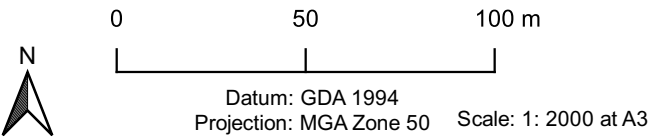
Dieback Occurrence

- Infested
- Uninfested
- Uninfested Unprotectable



Project Location

Dieback Occurrence Map
Black Cockatoo Reserve (South)
Shire of Mundaring
Priority Reserves Dieback Assessment 2019



Date: 24/11/2020	Prepared: A. Caubo	Project No: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Revision: H. Legge	
	Review:	

Figure 5



Callan Road Reserve

Reserve #: 38224

2018 Priority: 10

2019 Ranking: 17

Area: 7.0 ha

Historic Dieback Information

The 2017 Broadscale assessment reported that “approximately 40 % infested. Dieback widespread in lower slopes and some mid-slope areas” (Terratree Pty Ltd 2018).

Dieback Occurrence: Approximately 58% Infested

While the majority of Callan Road is Infested, a small 1.62 ha (23 %) Uninfested protectable area remains.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Infested	4.09	58.1
Uninfested	1.62	23.0
Uninterpretable	1.33	18.9
Total	7.04	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S27	<i>Xanthorrhoea gracilis</i>	415493	6471632	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

There is no Standard Protocol Dieback Signage in this reserve.

Recommended Management Actions

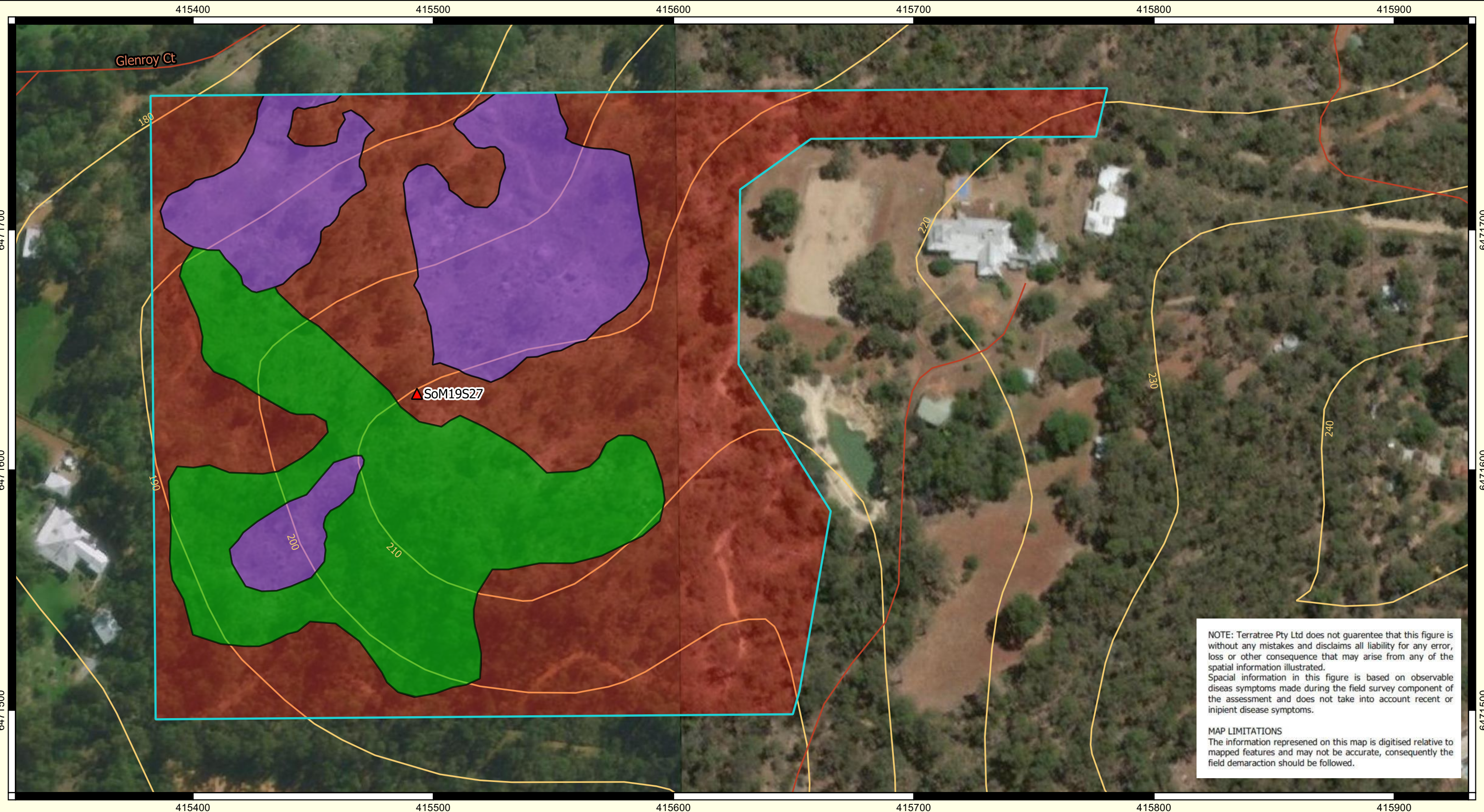
1. Establish rehabilitation trial plot(s).
2. Treat buffer at the interface of Infested and Uninfested with phosphite.



Photo 1: Infested vegetation (*Xanthorrhoea gracilis*) in Callan Road Reserve



Photo 2: Uninterpretable vegetation at Callan Road Reserve



Legend

- Assessment Area
- Road Network
- Contours

Sample Locations and Results

- ▲ Positive: *P. cinnamomi*

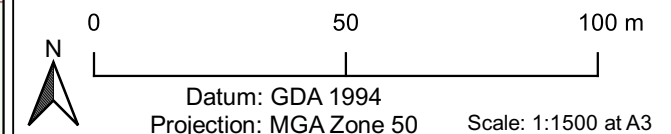
Dieback Occurence

- Infested
- Uninfested
- Uninterpretable



Project Location

Dieback Occurrence Map Callan Road Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019



Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Review: J. Grehan	
	Revision:	

Figure 6

Terratree

Cameron Road Reserve

Reserve #: 37837

2018 Priority: 17

2019 Ranking: 15

Area: 6.4 ha

Historic Dieback Information

The 2017 Broadscale assessment estimated reported that “There is likely to be an Uninfested upper slope area which is protectable and requires a Comprehensive Dieback assessment” (Terratree Pty Ltd 2018).

Dieback Occurrence: Approximately 50 % Infested

While the reserve is approximately 50 % Infested, 27 % (1.75ha) is Uninfested and this area may be contiguous with a larger Uninfested area on adjacent private land.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	0.4	6.28
Infested	3.21	50.39
Uninfested	1.75	27.47
Uninfested Unprotectable	1.01	15.86
Total	6.37	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S16	<i>Banksia grandis</i> & <i>Patersonia</i> sp.	422739	6477130	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

Soil movement associated with firebreak maintenance might be spreading Dieback.

Recommended Management Actions

1. Treat buffer at the interface of Infested and Uninfested with phosphite.
2. Revegetate Infested areas with resistant species or species that have a low susceptibility to *Phytophthora cinnamomi*.



Photo 1: Uninfested vegetation at Cameron Road Reserve



Photo 2: Infested vegetation at Cameron Road Reserve



NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated. Spatial information in this figure is based on observable dieback symptoms made during the field survey component of the assessment and does not take into account recent or inipient dieback symptoms.

MAP LIMITATIONS
The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demarcation should be followed.

Legend

- Assessment Area
- Road Network
- Contours

Sample Locations and Results

- Positive: *P. cinnamomi*

Dieback Occurrence

- Excluded
- Infested
- Uninfested
- Uninfested Unprotectable



Project Location

Dieback Occurrence Map Cameron Road Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019



0 50 100 m

Datum: GDA 1994

Projection: MGA Zone 50

Scale: 1:3 750 at A3

Date: 24/11/2020

Prepared: A. Caubo

Project #: T19011

Expiry: 23/11/2021

Checked: H. Legge

Figure 7

Review: J. Grehan

Revision:

Terratree

Carawatha Reserve

Reserve #: 13766
2018 Priority: 22
2019 Ranking: 23
Area: 0.40 ha
Suburb: Parkerville

Historic Dieback Information

The 2017 Broadscale assessment estimated reported that "There is likely to be an Uninfested area which are protectable". (Terratree Pty Ltd 2018)

Dieback Occurrence: Approximately 28% Infested

The initial sample test returned a negative result, but came back positive for *P. cinnamomi* when a retest was requested.

While the reserve is approximately 50% it may be contiguous with a larger Uninfested area on adjacent private land. While the Uninfested area within the reserve is too small to be protectable in the long term (0.31ha) it may be contiguous with a larger Uninfested area on adjacent land.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment
Infested	0.12	27.9
Uninfested Protectable	0.31	72.1
Total	0.43	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S25	<i>Xanthorrhoea preissii</i>	4181409	6472294	Negative	<i>P. cinnamomi</i>

Other Comments/Issues

nil

Recommended Management Actions

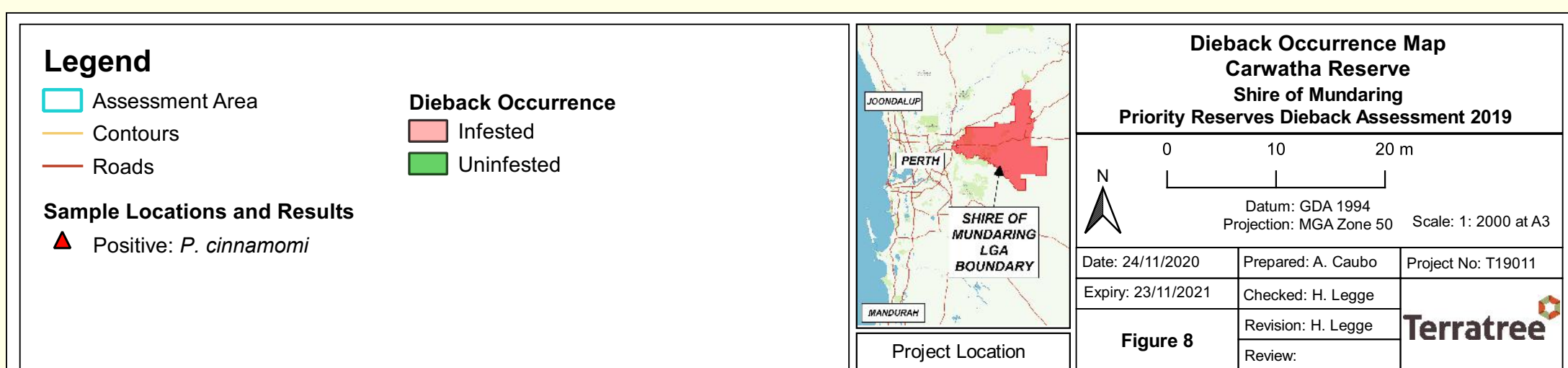
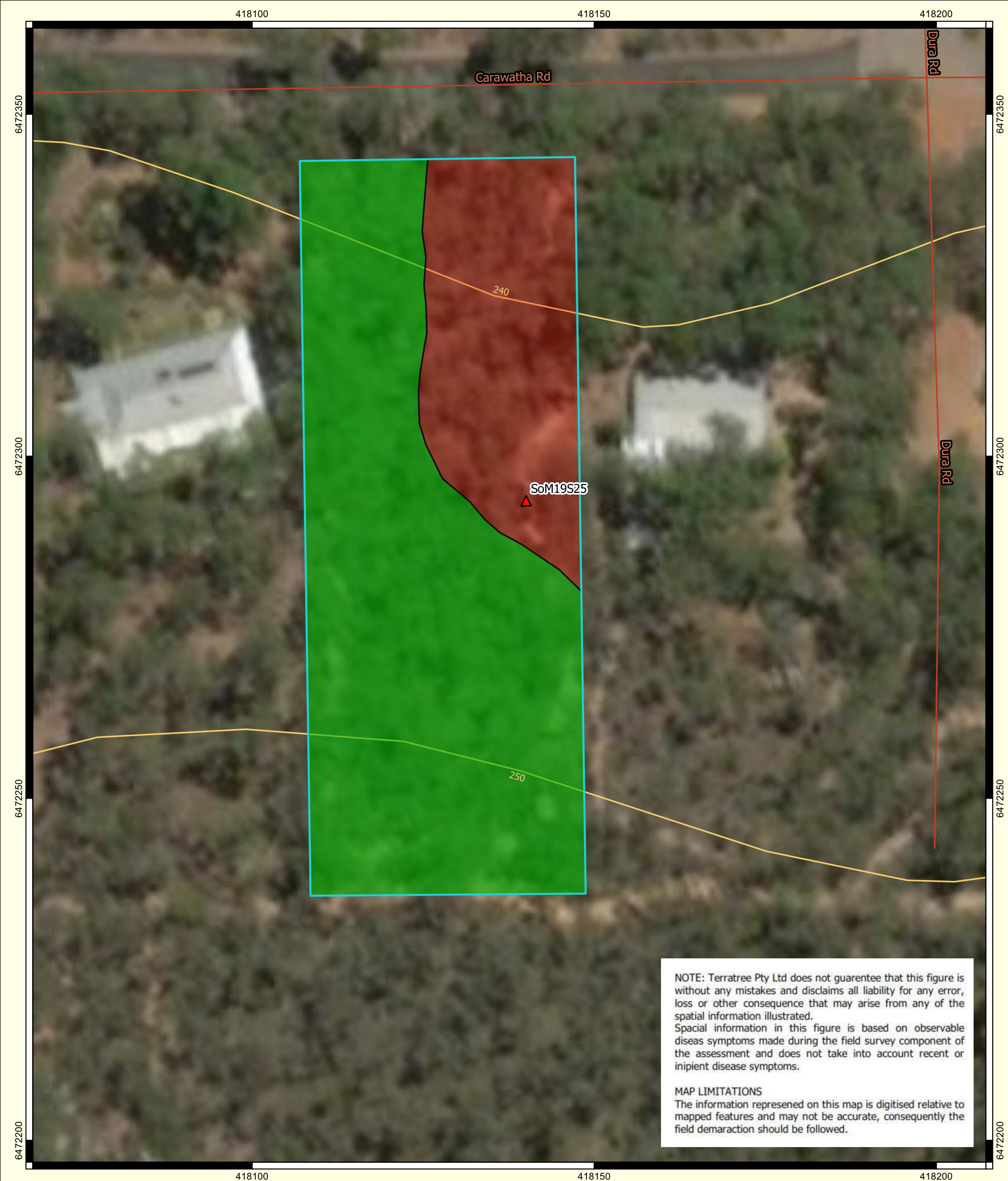
1. Engage with adjacent landowners to organise a Dieback assessment of adjoining native vegetation, to see if the Uninfested portion of the reserve is contiguous with a larger Uninfested area and therefore warrants treatment and protection.
2. Revegetate Infested areas with resistant or species that have low susceptibility of *P. cinnamomi*.



Photo 1: Sample site SoMS25 showing active disease at Carawatha Road Reserve



Photo 2: Uninfested vegetation at Carawatha Road Reserve



Chidlow Oval

Reserve #: 23921

2018 Priority: 18

2019 Ranking: 22

Area: 10 ha

Historic Dieback Information

The 2017 Broadscale assessment reported that “10-20 % of the reserve is Infested. Dieback is present in gully area, but the extent is unknown due to disturbance and Degraded vegetation condition” (Terratree Pty Ltd 2018).

Dieback Occurrence: Approximately 11 % Infested

It is unlikely that the remaining 0.57 ha will be protectable in the long term due to uncontrolled access and Dieback being present in the disturbed area to the east of the Uninfested area.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	8.29	82.98
Infested	1.13	11.31
Uninfested Unprotectable	0.57	5.71
Total	9.99	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S20	<i>Banksia squarrosa</i>	430919	6474169	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

- Uncontrolled public vehicle access is a significant issue in this reserve.
- There is no Standard Protocol Dieback Signage in this reserve.

Recommended Management Actions

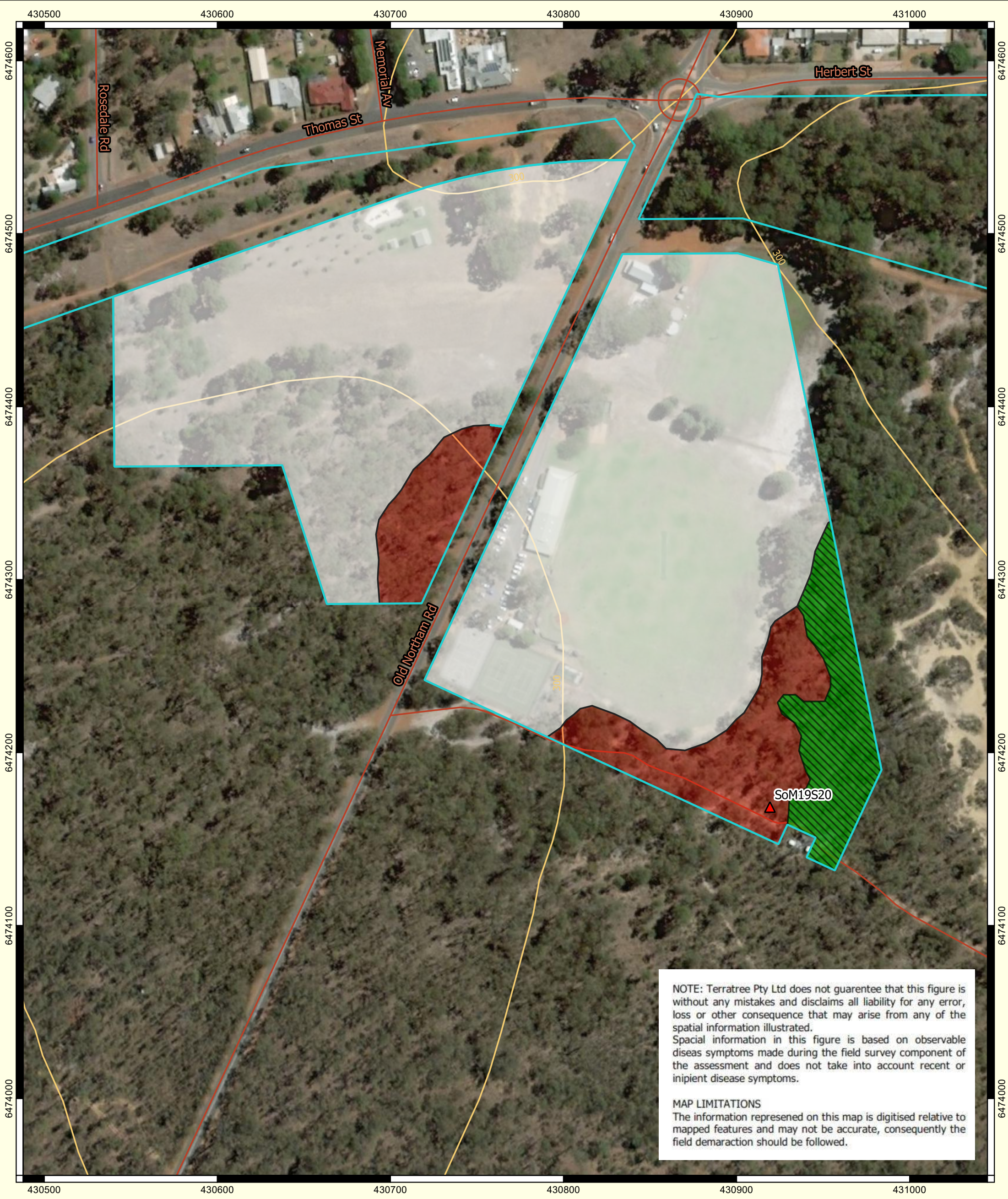
1. Treat buffer at the interface of Infested and Uninfested areas with phosphite.
2. Install Standard Protocol Dieback Signage.
3. Restrict unauthorised vehicle access.



Photo 1: Infested vegetation at Chidlow Oval



Photo 2: *Banksia squarrosa* that tested positive for *Phytophthora cinnamomi* at Chidlow Oval



Legend

Assessment Area

Contours

Roads

Dieback Occurrence

Excluded

Infested

Uninfested Unprotectable

Sample Locations and Results

Positive: *P. cinnamomi*

Project Location

Dieback Occurrence Map

Childlow Oval

Shire of Mundaring

Priority Reserves Dieback Assessment 2019

050100 m

Datum: GDA 1994
Projection: MGA Zone 50
Scale: 1: 2000 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project No: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Revision: H. Legge	
Review:		

Figure 9

Cookes Brook

Reserve #: 38367
2018 Priority: 21
2019 Ranking: NA (Uninterpretable)
Area: 9.0 ha

Historic Dieback Information

The Broadscale assessment determined that the reserve is mostly Uninterpretable, with some evidence of Dieback infestation in isolated *Xanthorrhoea preissii* upland of the brook (Terratree Pty Ltd 2018)

There are two historical positive *Phytophthora cinnamomi* sample sites in Lake Leschenaultia Reserve within 300 m of Cookes Brook.

Dieback Occurrence: Mostly Uninterpretable

Most of the site was Uninterpretable due to lack of disease indicator species. Areas of the reserve were Excluded from assessment due to the Degraded vegetation condition. The positive sample was taken from an isolated *X. preissii* and the disease could not be mapped due to a lack of indicator species.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	2.35	26.08
Uninterpretable	6.66	73.92
Total	9.01	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S17	<i>Xanthorrhoea preissii</i>	428833	6476999	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

Serious Blackberry infestation along large sections of the watercourse.

Recommended Management Actions

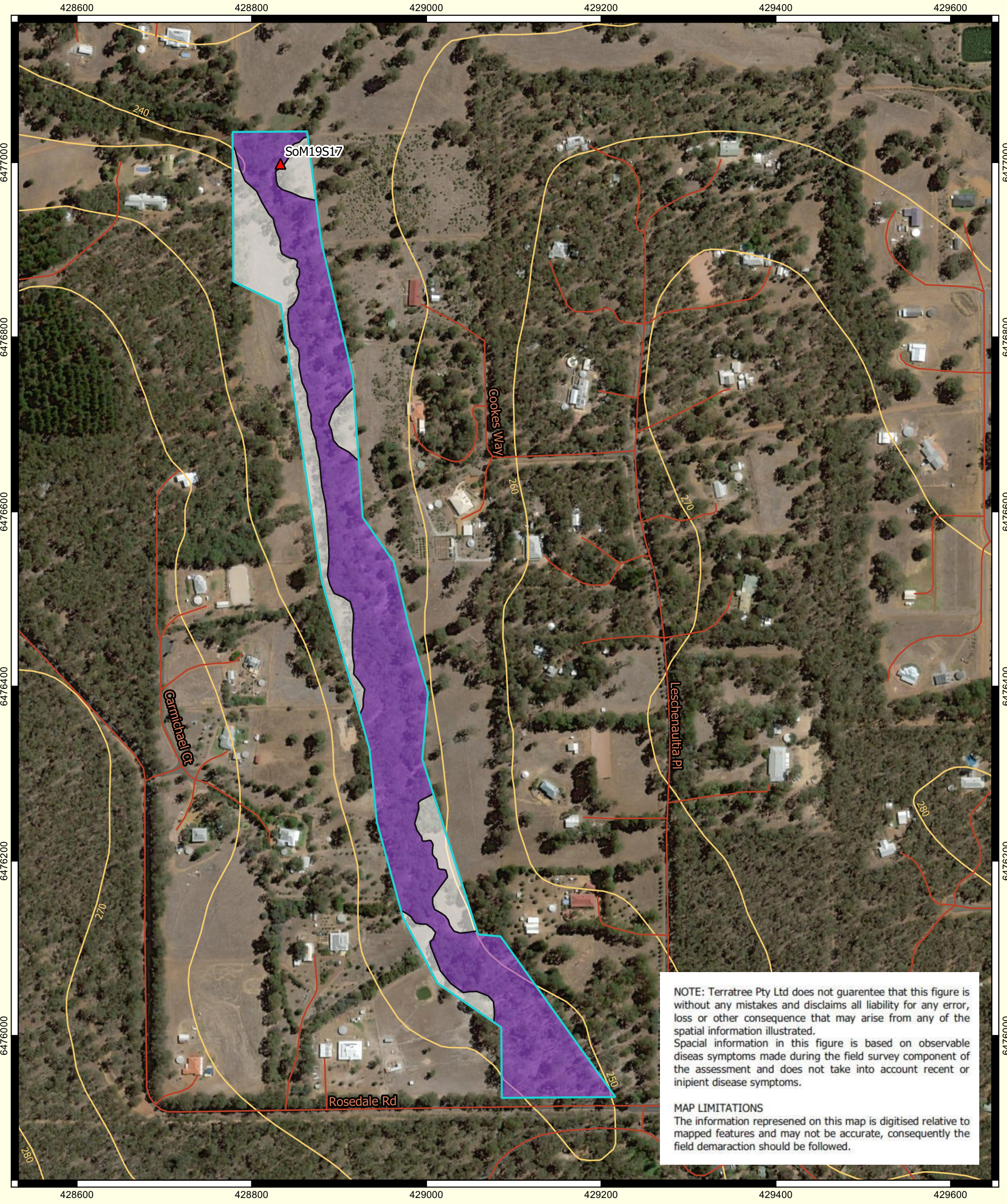
Weed control and revegetation with resistant species as the brook is Infested.



Photo 1: Uninterpretable and Excluded (Degraded) vegetation at Cookes Brook



Photo 2: Isolated *Xanthorrhoea preissii* that returned a positive result for *P. cinnamomi* at Cookes Brook



NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated. Spatial information in this figure is based on observable dieback symptoms made during the field survey component of the assessment and does not take into account recent or inipient dieback symptoms.

MAP LIMITATIONS
The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demarcation should be followed.

Legend

Assessment Area

Contours

Roads

Dieback Occurrence

Excluded

Uninterpretable

Sample Locations and Results

Positive: *P. cinnamomi*

Project Location

Dieback Occurrence Map

Cookes Brook Reserve

Shire of Mundaring

Priority Reserves Dieback Assessment 2019

0

50

100 m

N

Datum: GDA 1994

Projection: MGA Zone 50

Scale: 1: 4000 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project No: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Revision: H. Legge	
Review:		

Figure 10

Falls Road Reserve

Reserve #: 12453
2018 Priority: 8
2019 Ranking: 8
Area: 19.7 ha

Historic Dieback Information

The 2017 Broadscale assessment estimated that approximately 25 % of the reserve is Infested. (Terratree Pty Ltd 2018)

Dieback Occurrence: Approximately 30 % Infested

Falls Road Reserve has a significant Uninfested Protectable area (12.11 ha) or 62.5% of the reserve.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	0.11	0.56
Infested	5.88	29.88
Uninfested	12.11	61.53
Uninterpretable	1.58	8.03
Total	19.68	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S28	<i>Xanthorrhoea preissii</i>	417094	6472869	Negative	Negative
SOM19S32	<i>Banksia sessilis</i>	417238	6473049	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

- Signage is old and located incorrectly.

Recommended Management and Research Actions

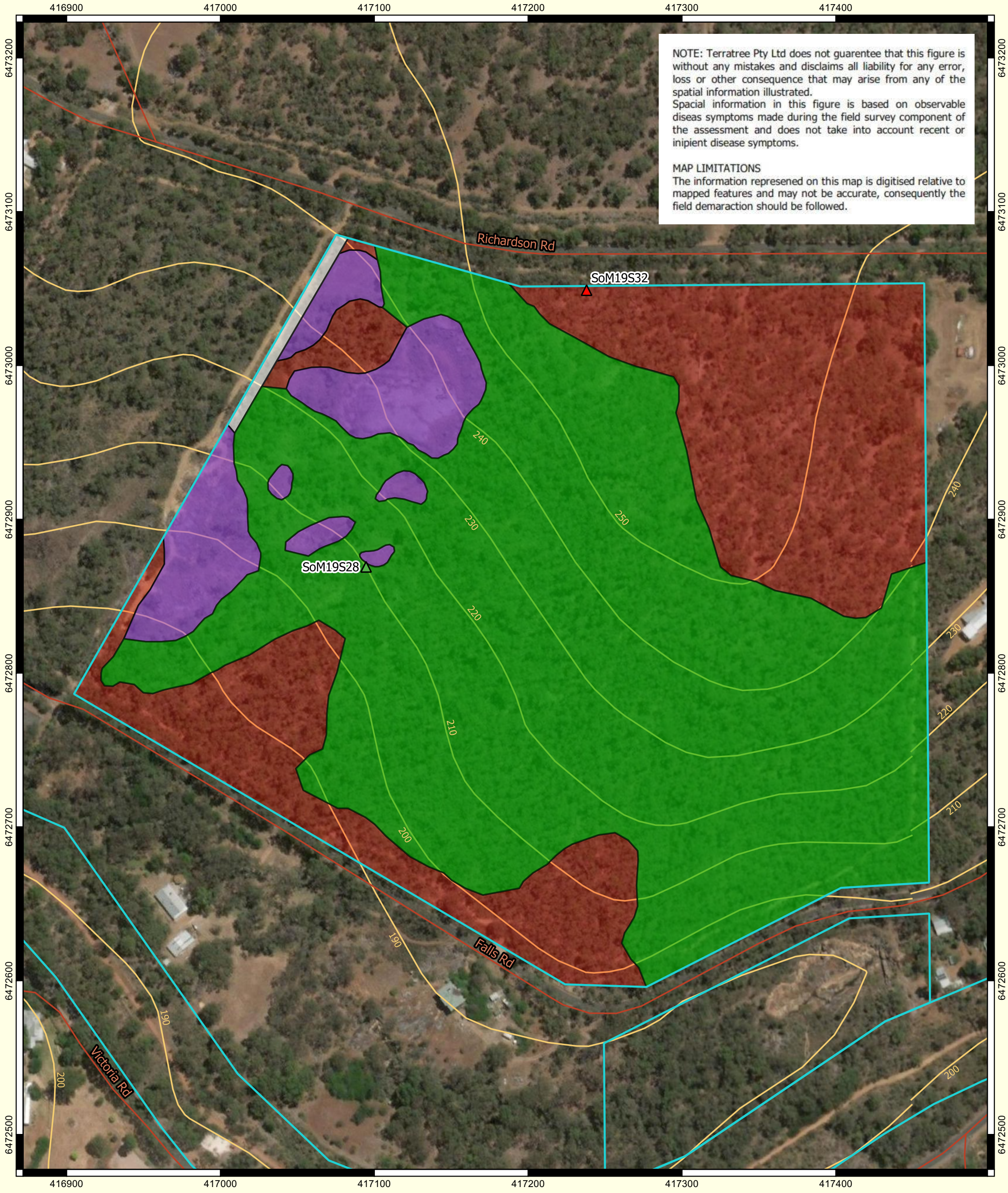
1. Undertake baseline flora surveys to quantify species richness and cover, along transects going from Infested to Uninfested in different soil and vegetation types in the reserve, to inform species selection for rehabilitation trails.
2. Establish rehabilitation trial plot(s).
3. Treat buffer at the interface of Infested and Uninfested areas with phosphite.
4. Install Standard Protocol Dieback Signage.



Photo 1: Uninfested vegetation at Falls Road Reserve



Photo 2: Infested vegetation with significantly reduced biomass at Falls Road Reserve



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Spatial information in this figure is based on observable dieback symptoms made during the field survey component of the assessment and does not take into account recent or inipient dieback symptoms.

MAP LIMITATIONS
The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demarcation should be followed.

Legend

Assessment Area

Contours

Roads

Dieback Occurrence

Excluded

Infested

Uninfested

Uninterpretable

Sample Locations and Results

Positive: *P. cinnamomi*

Negative

Project Location

Dieback Occurrence Map

Falls Road Reserve

Shire of Mundaring

Priority Reserves Dieback Assessment 2019

050100 m

Datum: GDA 1994

Projection: MGA Zone 50

Scale: 1: 2 250 at A3

Date: 24/11/2020

Expiry: 23/11/2021

Prepared: A. Caubo

Checked: H. Legge

Revision: H. Legge

Review:

Project No: T19011

Terratree

Figure 11

Gilfellow Reserve

Reserve #: 31264

2018 Priority: 32

2019 Ranking: 30 (Unprotectable)

Area: 3 ha

Historic Dieback Information

There was no evidence of active disease at the time of the 2017 Broadscale assessment and the assessment reported that "There is likely to be an Uninfested area which is protectable and requires a Comprehensive Dieback assessment" (Terratree Pty Ltd 2018).

Dieback Occurrence: Approximately 18% Infested

A large proportion of the reserve encompasses a drainage line that is Uninterpretable. Sample SOM19S23 returned a positive result for *Phytophthora cinnamomi*.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	0.85	28.72
Infested	0.54	18.24
Uninfested Unprotectable	0.06	2.03
Uninterpretable	1.51	51.01
Total	2.96	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S23	<i>Xanthorrhoea gracilis</i>	422293	6473349	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

- Substantial weed incursion in drainage line section of reserve.

Recommended Management Actions

- Treat buffer at the interface of Infested and Uninfested areas with phosphite.
- Install Standard Protocol Dieback Signage.



Photo 1: Uninfested vegetation at Gilfellow Reserve



Photo 2: Uninterpretable vegetation at Gilfellow Reserve



NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated. Spatial information in this figure is based on observable dieback symptoms made during the field survey component of the assessment and does not take into account recent or inipient dieback symptoms.

MAP LIMITATIONS
The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demarcation should be followed.

Legend

Assessment Area

Road Network

Contours

Dieback Occurrence

Excluded

Infested

Uninfested

Uninfested Unprotectable

Sample Locations and Results

Positive: *P. cinnamomi*

Project Location

Dieback Occurrence Map Gilfellon Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019

N

0

50

100 m

Datum: GDA 1994
Projection: MGA Zone 50

Scale: 1:1 500 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Review: J. Grehan	
	Revision:	

Figure 12

Glynden Reserve

Reserve #: 29959

2018 Priority: 23

2019 Ranking: 24

Area: 1.3 ha

Historic Dieback Information

There was no evidence of active disease at the time of the 2017 Broadscale assessment.

Dieback Occurrence: Approximately 6 % Infested

A large proportion of the reserve 0.8 ha (56.7 %) is Degraded with aggressive weeds such as *Watsonia* present. The Degraded area was excluded from assessment. While sample SOM19S61 returned a positive result for *Phytophthora cinnamomi*, the Infested area only comprises 5.9 % of the reserve. There is a small Uninfested Protectable area in the upland portion of the reserve.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	0.76	56.72
Infested	0.08	5.97
Uninfested	0.2	14.93
Uninfested Unprotectable	0.09	6.72
Uninterpretable	0.21	15.67
Total	1.34	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S61	<i>Xanthorrhoea gracilis</i>	409505	6468841	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

- Significant *Watsonia* population.

Recommended Management Actions

1. Revegetate Excluded (Degraded) areas with resistant species or species that have a low susceptibility to *P. cinnamomi*.



Photo 1: Uninfested vegetation at Glynden Reserve



Photo 2: Uninterpretable vegetation at Glynden Reserve

409400

409450

409500

409550

6468900

6468900

6468850

6468850

6468800

6468800

6468750

6468750

6468700

6468700

409400

409450

409500


409550

NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated.
Spatial information in this figure is based on observable disease symptoms made during the field survey component of the assessment and does not take into account recent or incipient disease symptoms.

MAP LIMITATIONS

The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demarcation should be followed.


Legend

 Assessment Area

 Contours

 Roads

Sample Locations and Results

 Positive: *P. cinnamomi*

Dieback Occurrence

 Excluded

 Infested

 Uninfested

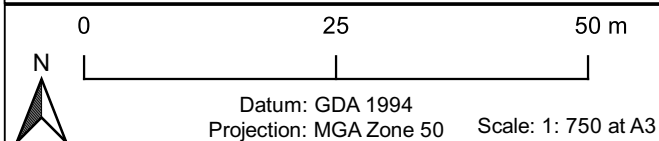
 Uninfested Unprotectable

 Uninterpretable



Project Location

Dieback Occurrence Map Glynden Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019



Date: 24/11/2020

Prepared: A. Caubo

Project No: T19011

Expiry: 23/11/2021

Checked: H. Legge

Revision: H. Legge

Review:

Figure 13

Terratree

Hilltop Reserve

Reserve #: 41670

2018 Priority: 29

2019 Ranking: 22

Area: 1.1 ha

Historic Dieback Information

The 2017 Broadscale assessment reported that approximately 20 % of the reserve was Infested.

Dieback Occurrence: Approximately 28 % Infested

Approximately one-third of the reserve is Uninfested (0.32ha) While sample SOM19S35 returned a positive result for *Phytophthora cinnamomi*, the Infested area comprises (0.30ha) of the reserve with the remainder being Uninterpretable (0.33 ha) and Excluded (0.10 ha).

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	0.09	7.89
Infested	0.3	26.32
Uninfested	0.32	28.07
Uninfested Unprotectable	0.1	8.77
Uninterpretable	0.33	28.95
Total	1.14	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S35	<i>Xanthorrhoea gracilis</i>	418805	6469989	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

- Weed incursions including Golden Wattle (*Acacia longifolia*) in Degraded portions of the reserve.

Recommended Management Actions

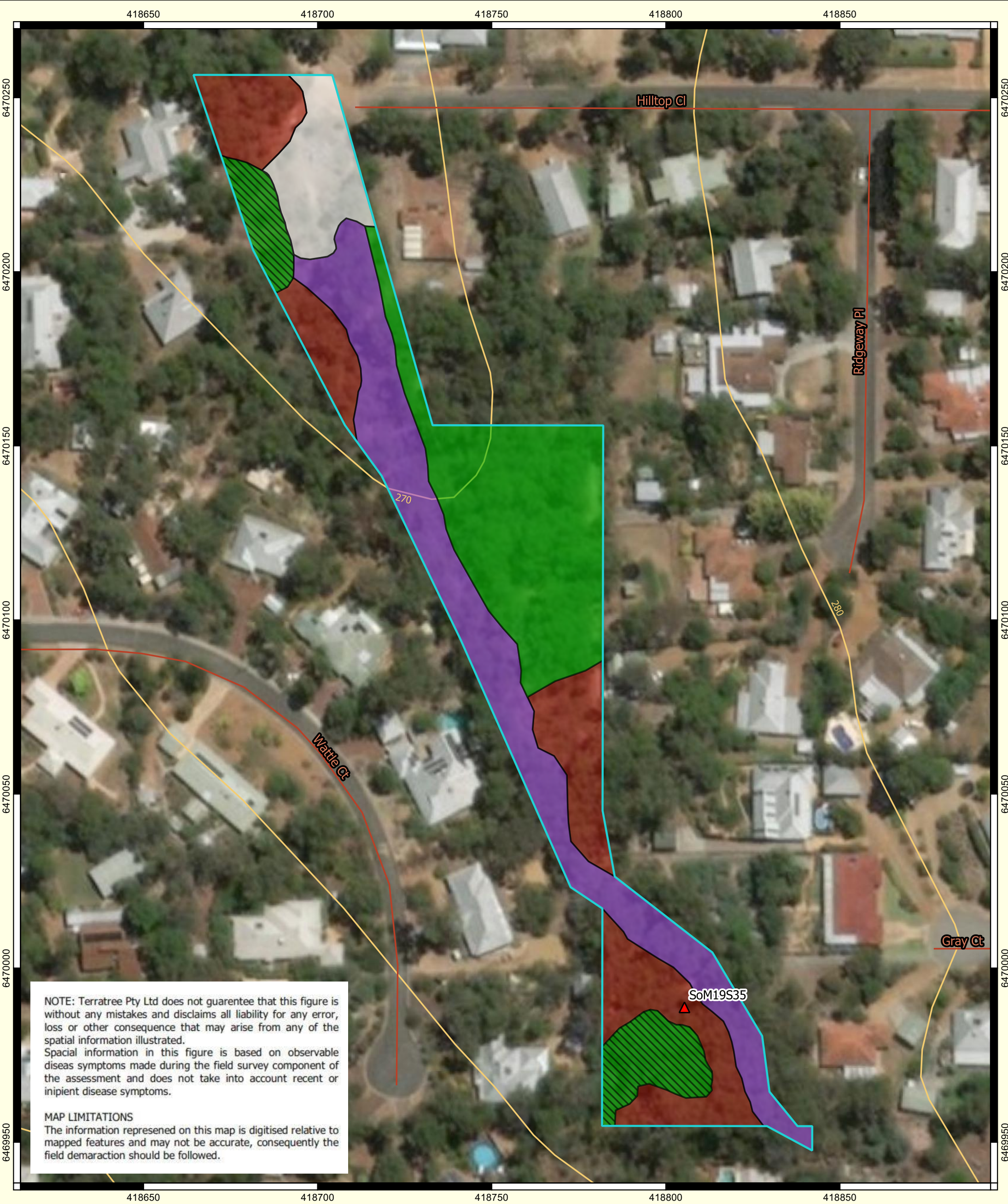
1. Treat buffer at the interface of Infested and Uninfested Protectable areas with phosphite.
2. Install Standard Protocol Dieback Signage.



Photo 1: Uninfested vegetation at Hilltop Reserve



Photo 2: Sample SOM19S35 (*Xanthorrhoea gracilis*) that returned a positive result for *P. cinnamomi* at Hilltop Reserve



Legend

Assessment Area

Contours

Roads

Sample Locations and Results

Positive: *P. cinnamomi*

Dieback Occurrence

Excluded

Infested

Uninfested

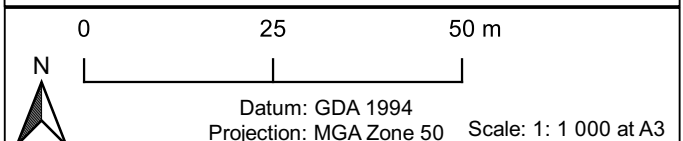
Uninfested Unprotectable

Uninterpretable



Project Location

Dieback Occurrence Map Hilltop Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019



Date: 24/11/2020

Prepared: A. Caubo

Project No: T19011

Expiry: 23/11/2021

Checked: H. Legge

Figure 14

Revision: H. Legge

Review:

Terratree

Hovea Conservation Park

Reserve #: 14163

2018 Priority: 9

2019 Ranking: 6

Area: 40.9 ha

Historic Dieback Information

The 2017 Broadscale assessment reported that, “the western reserve is approximately 50 % infested. Dieback widespread in lower slopes and mid-slope areas especially in the southern portion and along Hedges Road. There is a very active infestation in the northern portion of the reserve and along the narrow access corridor to the east. The eastern Reserve is approximately 70 % infested. Dieback is widespread apart from an Uninfested upland area in the northern portion of the reserve” (Terratree Pty Ltd 2018).

Dieback Occurrence: Approximately 41% Infested

Hovea Conservation Park has been subjected to a lot of disturbance over its history with large gravel pit areas in the western reserve along Hedges Road, logging, rubbish dumping and uncontrolled vehicular access. Notwithstanding, there remains large Uninfested Protectable areas in both the western and eastern parts of the reserve. It is crucial for the long-term protection of these areas that issues around uncontrolled vehicular access are addressed and buffers at the interface of Infested and Uninfested Protectable areas are treated with phosphite.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	3.7	9.05
Infested	16.71	40.88
Temporarily Uninterpretable	2.82	6.90
Uninfested	16.81	41.12
Uninterpretable	0.84	2.05
Total	40.88	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S64	<i>Xanthorrhoea gracilis</i>	418103	6471214	<i>P. cinnamomi</i>	N/A
SOM19S65	<i>Xanthorrhoea gracilis</i>	417010	6471683	<i>P. cinnamomi</i>	N/A
SOM19S66	<i>Xanthorrhoea gracilis</i>	417123	6471409	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

- The gate into the reserve along Hedges Road remains unlocked.

- There are several areas of dumping that include asbestos.

Recommended Management & Research Actions

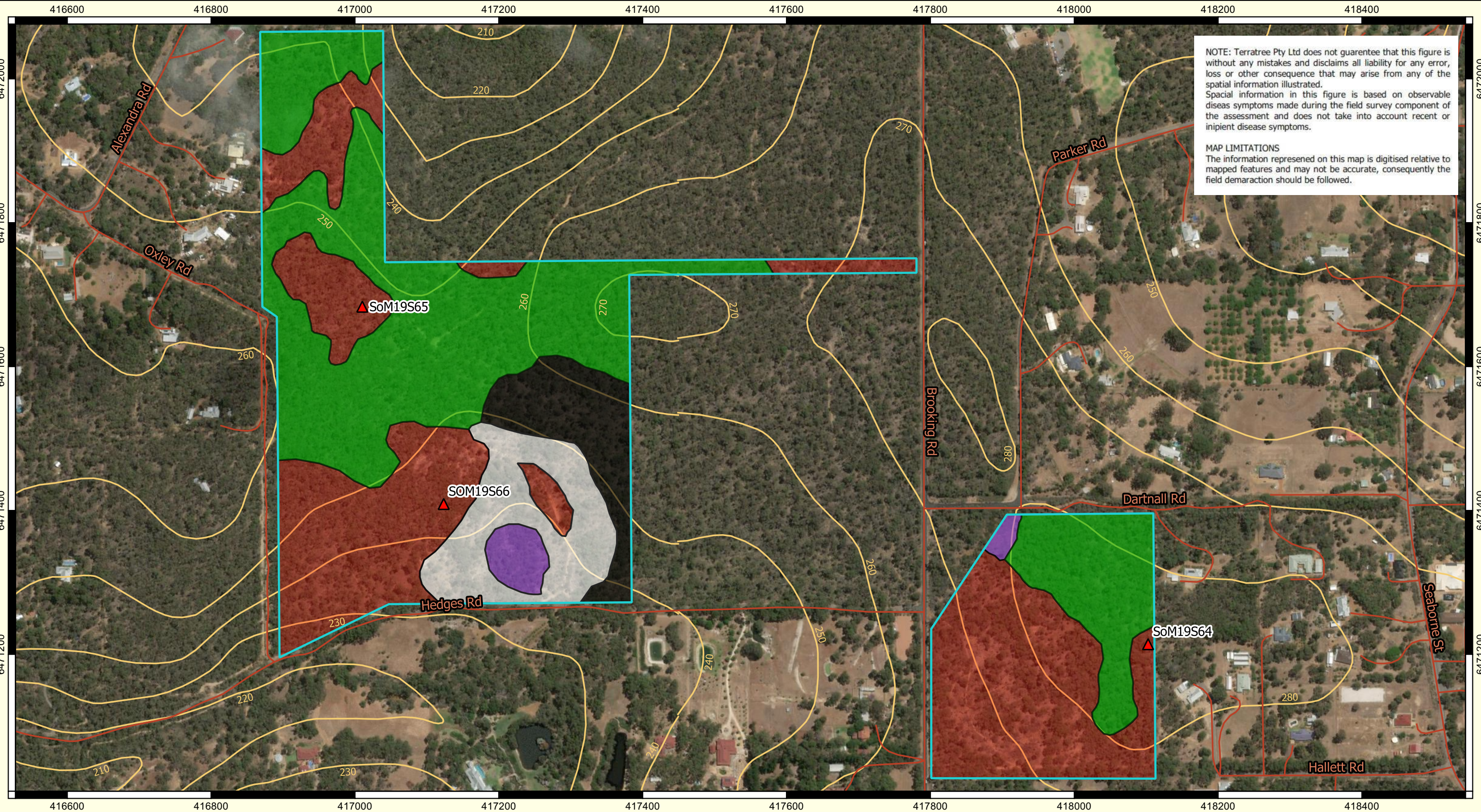
1. Treat buffer at the interface of Infested and Uninfested Protectable areas with phosphite.
2. Review and manage unauthorised vehicle access to the reserve.
3. Undertake baseline flora surveys to quantify species richness and cover, along transects going from Infested to Uninfested in different soil and vegetation types in the reserve, to inform species selection for rehabilitation trails.
4. Establish rehabilitation trial plot(s).
5. Install Standard Protocol Dieback Signage.



Photo 1: Uninfested vegetation at Hovea Conservation Park



Photo 2: Infested vegetation at Hovea Conservation Park



NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated. Spatial information in this figure is based on observable dieback symptoms made during the field survey component of the assessment and does not take into account recent or inipient dieback symptoms.

MAP LIMITATIONS
The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demarcation should be followed.

Legend

Assessment Area

Road Network

Contours

Sample Locations and Results

Positive: *P. cinnamomi*

Dieback Occurrence

Excluded

Infested

Temporarily Uninterpretable

Uninfested

Uninfested Unprotectable

Uninterpretable

Project Location

Dieback Occurrence Map Hovea Conservation Park Shire of Mundaring Priority Reserves Dieback Assessment 2019

0100200 m

N

Datum: GDA 1994
Projection: MGA Zone 50

Scale: 1:5 000 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Review: J. Grehan	
	Revision:	

Figure 15

Jane Byfield Reserve

Reserve #: 880

2018 Priority: 27 (Unprotectable)

2019 Ranking: 31 (Unprotectable)

Area: 0.6 ha

Historic Dieback Information

There is a historical (2002) sample result for *Phytophthora cinnamomi* in south-east of the reserve. There was no evidence of active disease at the time of the 2017 Broadscale assessment.

Dieback Occurrence: Approximately 54 % Infested

There is a large old gravel pit on the northern edge of the reserve along Great Eastern Highway.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	0.22	34.92
Infested	0.34	53.97
Uninfested Unprotectable	0.07	11.11
Total	0.63	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S34	<i>Xanthorrhoea gracilis</i>	418291	6470233	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

- Uncontrolled public vehicle access is a significant issue in this reserve.

Recommended Management Actions

1. Restrict unauthorised vehicle access.
2. Revegetate Excluded (Degraded) areas with resistant species or species that have a low susceptibility to *P. cinnamomi*.



Photo 1: Infested vegetation at Jane Byfield Reserve



Photo 2: Highly disturbed Excluded (Degraded) vegetation at Jane Byfield Reserve

418200

418250

418300

418350

6470300

6470250

6470200

6470150

6470300

6470250

6470200

6470150

418200

418250

418300

418350

NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated.
Spatial information in this figure is based on observable disease symptoms made during the field survey component of the assessment and does not take into account recent or inipient disease symptoms.

MAP LIMITATIONS

The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demarcation should be followed.

Legend

Assessment Area

Contours

Roads

Sample Locations and Results

Positive: *P. cinnamomi*

Dieback Occurrence

Excluded

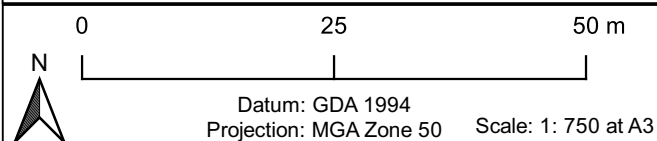
Infested

Uninfested Unprotectable



Project Location

Dieback Occurrence Map
Jane Byfield Reserve
Shire of Mundaring
Priority Reserves Dieback Assessment 2019



Date: 24/11/2020	Prepared: A. Caubo	Project No: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Revision: H. Legge	
	Review:	

Figure 16



Lechenaultia Park

Reserve #: 25433

2018 Priority: 19

2019 Ranking: 21

Area: 4 ha

Historic Dieback Information

The 2017 Broadscale assessment reported that approximately 20 % of the reserve was Infested.

Dieback Occurrence: Approximately 25% Infested

Lechenaultia Park has been subjected to a lot of disturbance over its history with gravel extraction and a considerable amount of rubbish dumping and uncontrolled vehicular access. Notwithstanding, a small (0.4 ha) Uninfested area remains that is protectable, provided the appropriate management strategies are implemented.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	1.97	48.64
Infested	1	24.69
Uninfested	0.39	9.63
Uninfested Unprotectable	0.38	9.38
Uninterpretable	0.31	7.65
Total	4.05	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S18	<i>Xanthorrhoea gracilis</i>	427117	6473363	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

- Significant amount of rubbish dumping (former Shire of Mundaring landfill rubbish dump site).

Recommended Management Actions

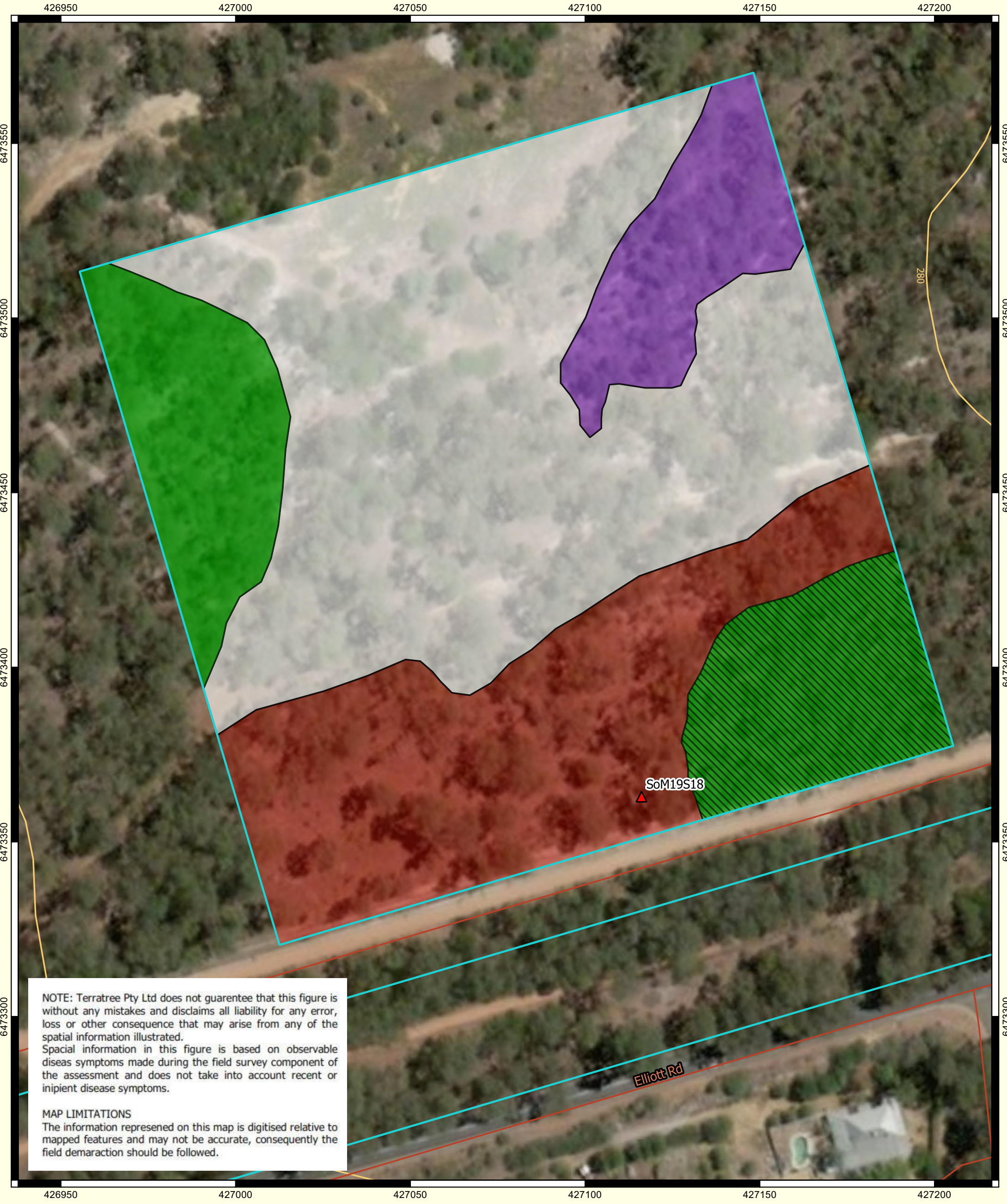
1. Treat buffer at the interface of Infested and Uninfested areas with phosphite.
2. Restrict unauthorised vehicle access.
3. Revegetate Excluded (Degraded) areas with resistant species or species that have a low susceptibility to *Phytophthora cinnamomi*.



Photo 1: Uninfested vegetation at Lechenaultia Park



Photo 2: *Xanthorrhoea gracilis* infected with *P. cinnamomi* at Lechenaultia Park



NOTE: Terratree Pty Ltd does not guarentee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated.
Spacial information in this figure is based on observable dieas symptoms made during the field survey component of the assessment and does not take into account recent or inipient disease symptoms.

MAP LIMITATIONS
The information represened on this map is digitised relative to mapped features and may not be accurate, consequently the field demaraction should be followed.

Legend

Assessment Area

Contours

Roads

Dieback Occurrence

Excluded

Infested

Uninfested

Uninfested Unprotectable

Uninterpretable

Sample Locations and Results

Positive: *P. cinnamomi*

Dieback Occurrence Map

Leschenaultia Park

Shire of Mundaring

Priority Reserves Dieback Assessment 2019

N

0

25

50 m

Datum: GDA 1994

Projection: MGA Zone 50

Scale: 1:1 000 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project No: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Revision: H. Legge	
	Review:	

Figure 17

Marloo Theatre Reserve

Reserve #: 36045

2018 Priority: 30

2019 Ranking: 20

Area: 3.0 ha

Historic Dieback Information

There was no evidence of active disease at the time of the 2017 Broadscale assessment.

Dieback Occurrence: Approximately 1.7% Infested

While only 1.7 % (0.05 ha) of the reserve is Infested, the majority of the reserve (2.38 ha, 79%) is Excluded due to the Degraded vegetation condition. Approximately 0.4 ha (14%) is Uninfested and Protectable.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	2.38	79.07
Infested	0.05	1.66
Uninfested	0.42	13.95
Uninfested Unprotectable	0.06	1.99
Uninterpretable	0.1	3.32
Total	3.01	100

Sample results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S60	<i>Xanthorrhoea preissii</i>	410349	6470656	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

- In addition to Veldt Grass, Tagasaste, Olive and Cape Lilac trees, Agave and *Acacia pycnantha*, there are several populations of *Watsonia* within the reserve.

Recommended Management Actions

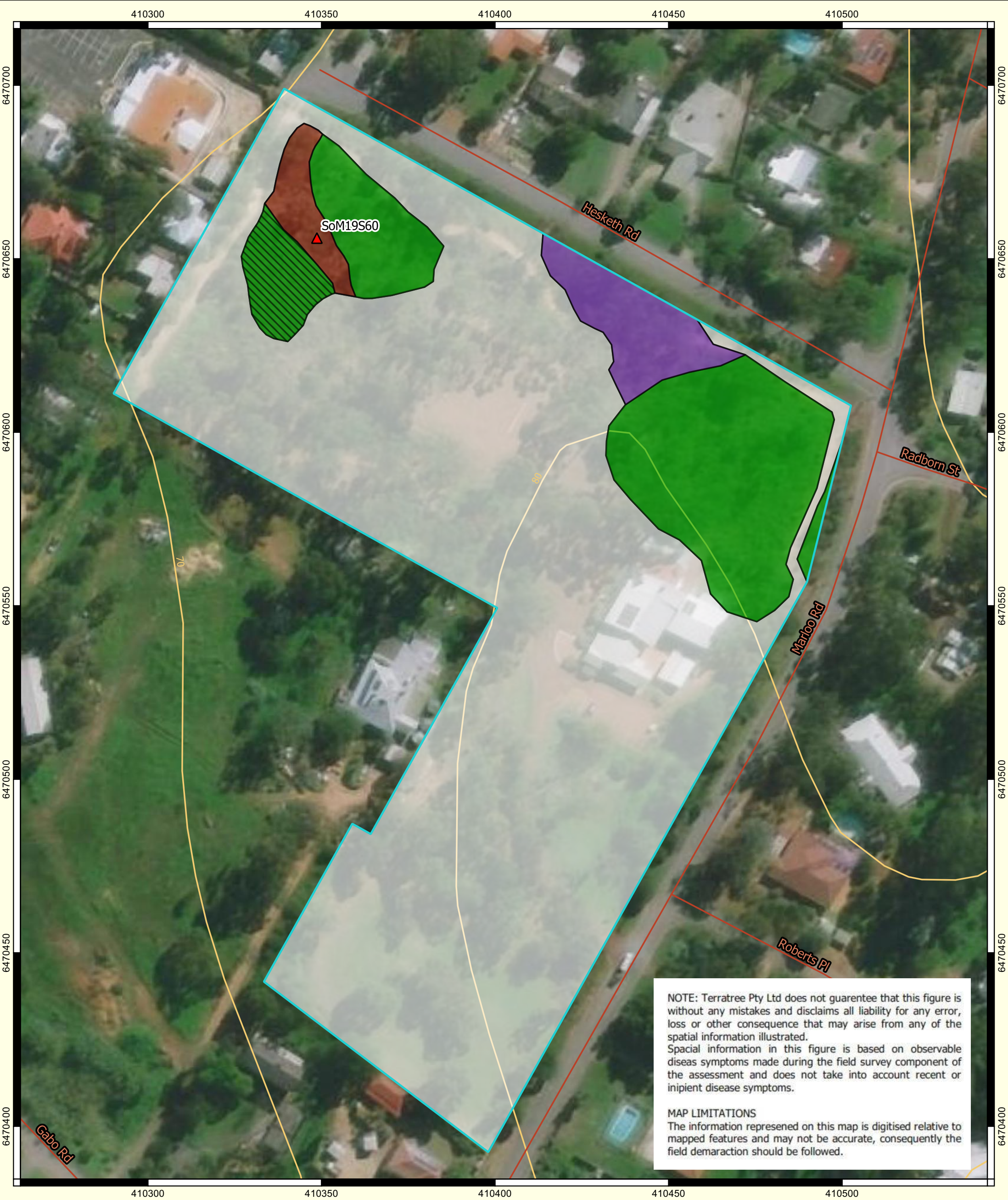
1. Revegetate Excluded (Degraded) areas with resistant species or species that have a low susceptibility to *Phytophthora cinnamomi*.
2. Treat buffer at the interface of Infested and Uninfested areas with phosphite.



Photo 1: Uninfested vegetation at Marloo Theatre Reserve



Photo 2: Uninterpretable and Excluded (Degraded) vegetation at Marloo Theatre Reserve



Legend

- Assessment Area
- Contours
- Roads

Sample Locations and Results

- Positive: *P. cinnamomi*

Dieback Occurrence

- Excluded
- Infested
- Uninfested
- Uninfested Unprotectable
- Uninterpretable



Project Location

Dieback Occurrence Map Marloo Theatre Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019

<div>02550</div> <div>Datum: GDA 1994 Projection: MGA Zone 50</div> <div>Scale: 1:1 000 at A3</div>		
Date: 24/11/2020	Prepared: A. Caubo	Terratree
Expiry: 23/11/2021	Checked: H. Legge	
	Revision: H. Legge	
Review:		

Figure 18

Marriott Park

Reserve #: 25700
2018 Priority: 26
2019 Ranking: NA (Uninterpretable)
Area: 1.1 ha

Historic Dieback Information

The 2017 Broadscale assessment reported that the reserve was “Uninterpretable. Creek likely to be infested” (Terratree Pty Ltd 2018).

Dieback Occurrence: 0 % Infested

The vegetation in Marriott Park was predominantly Excluded (92%) due to the Degraded vegetation with the remaining area being categorised as Uninterpretable due to a lack of disease indicator species.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	1.05	92.11
Uninterpretable	0.09	7.89
Total	1.14	100

Sample Results

No samples were taken from this reserve, as there were no fresh deaths to sample from and the vegetation was mostly Excluded or Uninterpretable.

Other Comments/Issues

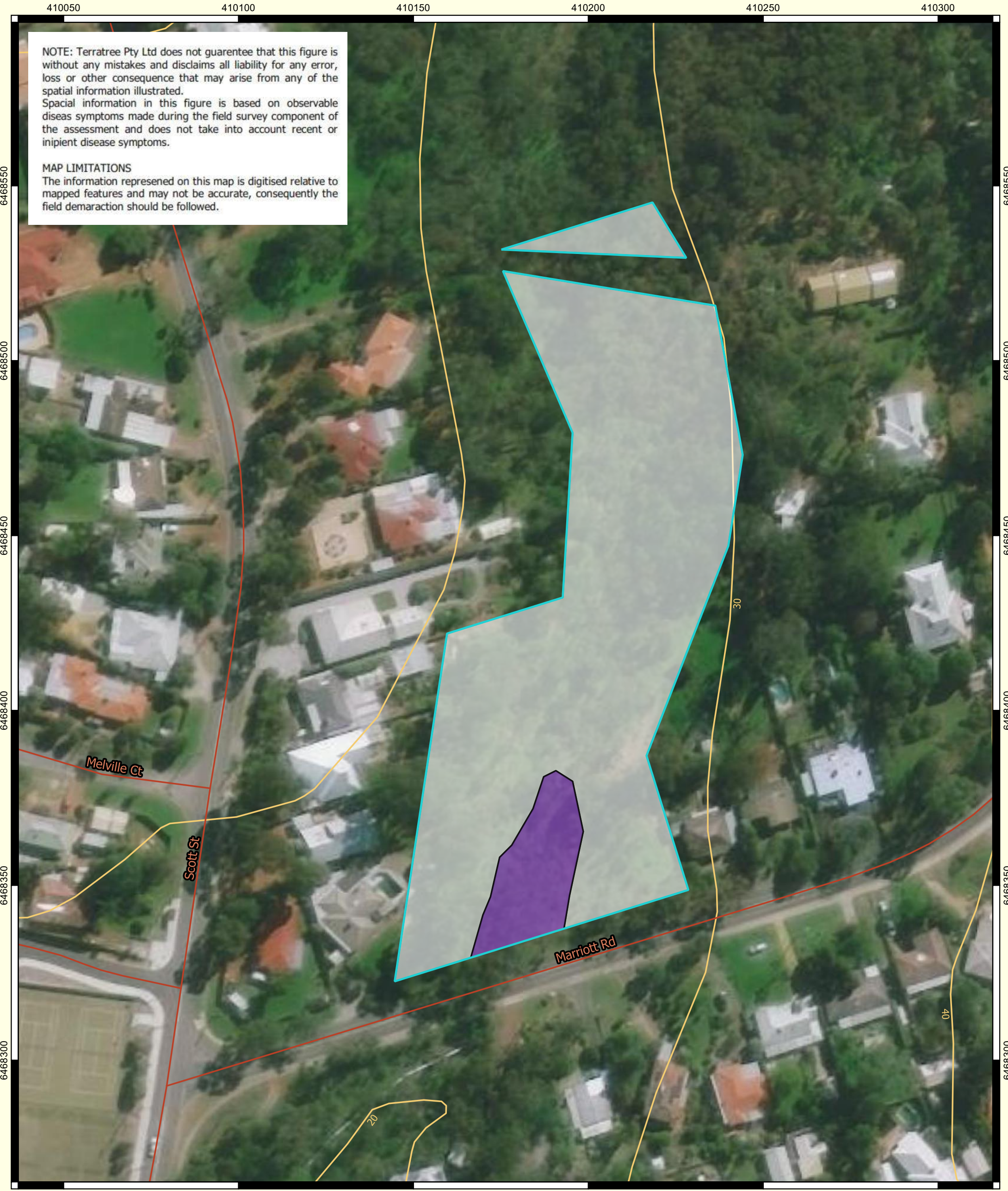
- Narrow-leaf cotton bush (*Gomphocarpus fruticosus*) was recorded in the southern portion of the reserve during the 2017 assessment.

Recommended Management Actions

1. Revegetate Excluded (Degraded) areas with resistant species or species that have a low susceptibility to *Phytophthora cinnamomi*.



Photo 1: Uninterpretable and Excluded (Degraded) vegetation at Marriott Park



NOTE: Terratree Pty Ltd does not guarentee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated.
Spacial information in this figure is based on observable diseas symptoms made during the field survey component of the assessment and does not take into account recent or inipient disease symptoms.

MAP LIMITATIONS
The information represened on this map is digitised relative to mapped features and may not be accurate, consequently the field demaraction should be followed.

Legend

Assessment Area

Contours

Roads

Dieback Occurrence

Excluded

Uninterpretable

Project Location

Dieback Occurrence Map

Marriott Park

Shire of Mundaring

Priority Reserves Dieback Assessment 2019

N

0

25

50 m

Datum: GDA 1994
Projection: MGA Zone 50
Scale: 1:1 000 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project No: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Revision: H. Legge	
Review:		

Figure 19

Mathieson Road Transfer Station

Reserve #: 31053

2018 Priority: 14

2019 Ranking: 7

Area: 51.8 ha

Historic Dieback Information

The 2017 Broadscale assessment estimated that approximately 25 % of the reserve is Infested. There are two historical (1995) sample results for *Phytophthora cinnamomi* in the southeast of the reserve.

Dieback Occurrence: Approximately 44.5 % Infested

Although 23.05 ha of the reserve is Infested, a large Uninfested Protectable area of 14.1 ha (27 %) remains, with about the same area being Excluded due to the Degraded vegetation condition.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	14.67	28.31
Infested	23.05	44.48
Uninfested	14.1	27.21
Total	51.82	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S43	<i>Banksia grandis</i>	428771	6472619	Negative	N/A
SOM19S45	<i>Banksia sessilis</i>	429551	6473068	Negative	N/A

Other Comments/Issues

- Uncontrolled public vehicle access is a significant issue in this reserve.
- Rubbish entering the reserve from the transfer station is a problem.

Recommended Management Actions

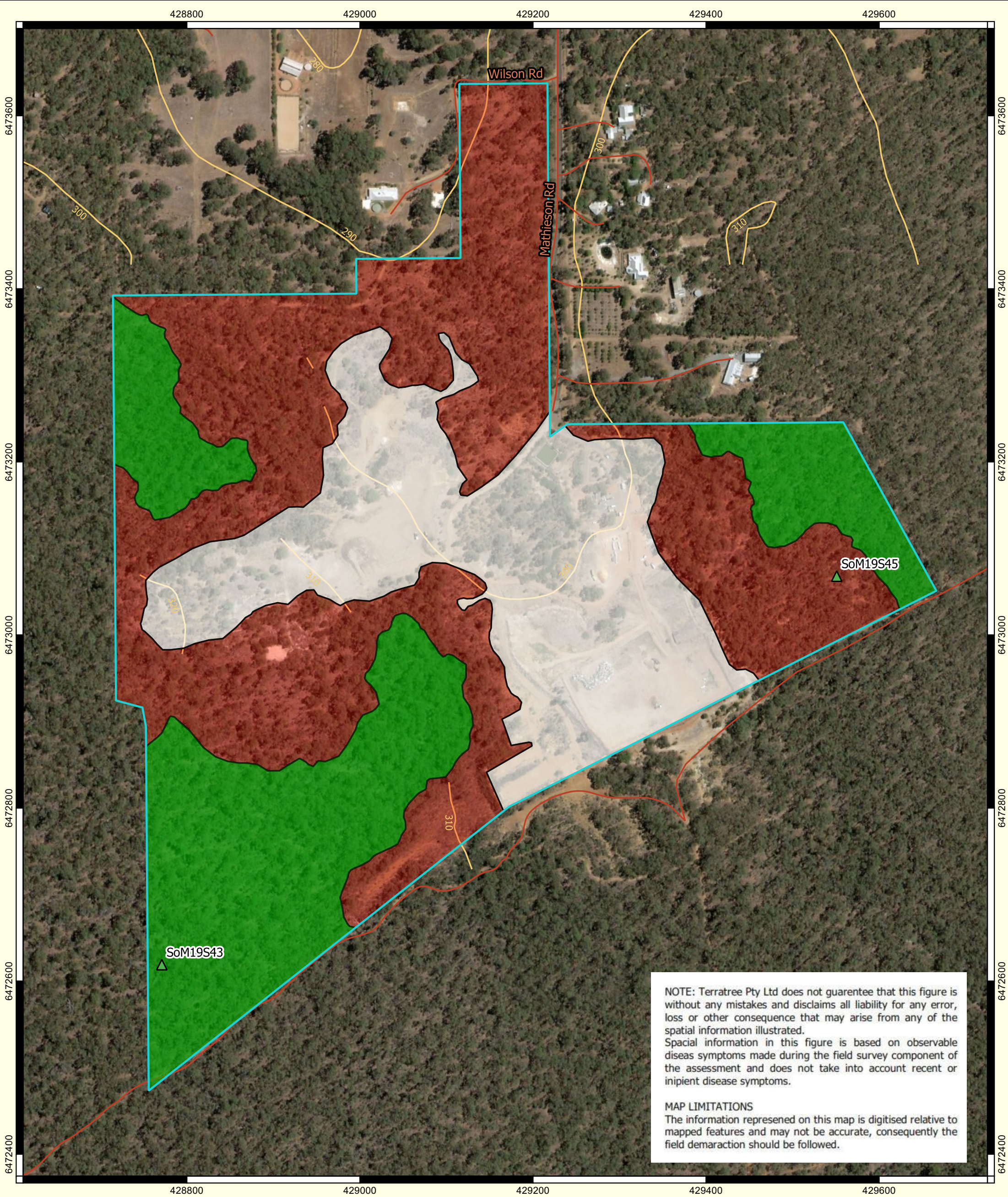
1. Treat buffer at the interface of Infested and Uninfested Protectable areas with phosphite.
2. Review and manage uncontrolled vehicular access to the reserve.
3. Establish rehabilitation trial plot(s).



Photo 1: Uninfested vegetation at Mathieson Road Transfer Station



Photo 2: Infested vegetation at Mathieson Transfer Station with recently dead *Banksia grandis*



NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated. Spatial information in this figure is based on observable dieback symptoms made during the field survey component of the assessment and does not take into account recent or incipient dieback symptoms.

MAP LIMITATIONS
The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demarcation should be followed.

Legend

- Assessment Area
- Contours
- Roads

Sample Locations and Results

- Negative

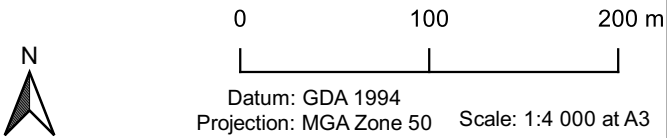
Dieback Occurrence


- Excluded
- Infested
- Uninfested



Project Location

**Dieback Occurrence Map
Mathieson Transfer Station
Shire of Mundaring
Priority Reserves Dieback Assessment 2019**



Date: 24/11/2020	Prepared: A. Caubo	Project No: T19011
Expiry: 23/11/2021	Checked: H. Legge	 Terratree
Figure 20	Revision: H. Legge	
	Review:	

Milligan Road Reserve

Reserve #: 22843
2018 Priority: 28
2019 Ranking: NA (Uninterpretable)
Area: 2.4 ha

Historic Dieback Information

The 2017 Broadscale assessment reported that the reserve was Uninterpretable. While there was no evidence of active disease at the time of the 2017 Broadscale assessment, there are three historical sample results for *Phytophthora cinnamomi* from 2007, approximately 120 m north-west of the reserve.

Dieback Occurrence: 0 % Infested

Given there are three historical positive sample results for *P. cinnamomi* within 120 m of the reserve, it is likely that the reserve is Infested, but all the susceptible species have succumbed to the disease over a long period. The vegetation is now mostly (66 %) Uninterpretable as it is dominated by resistant (mainly *Acacia*) species, especially *Acacia celastriifolia*.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	0.82	33.74
Uninterpretable	1.61	66.26
Total	2.43	100

Sample Results

No samples were taken from this reserve, as there were no recent deaths to sample and the vegetation was mostly Uninterpretable or Excluded (Degraded).

Other Comments/Issues

- Uncontrolled public vehicular access is a significant issue in this reserve.

Recommended Management Actions

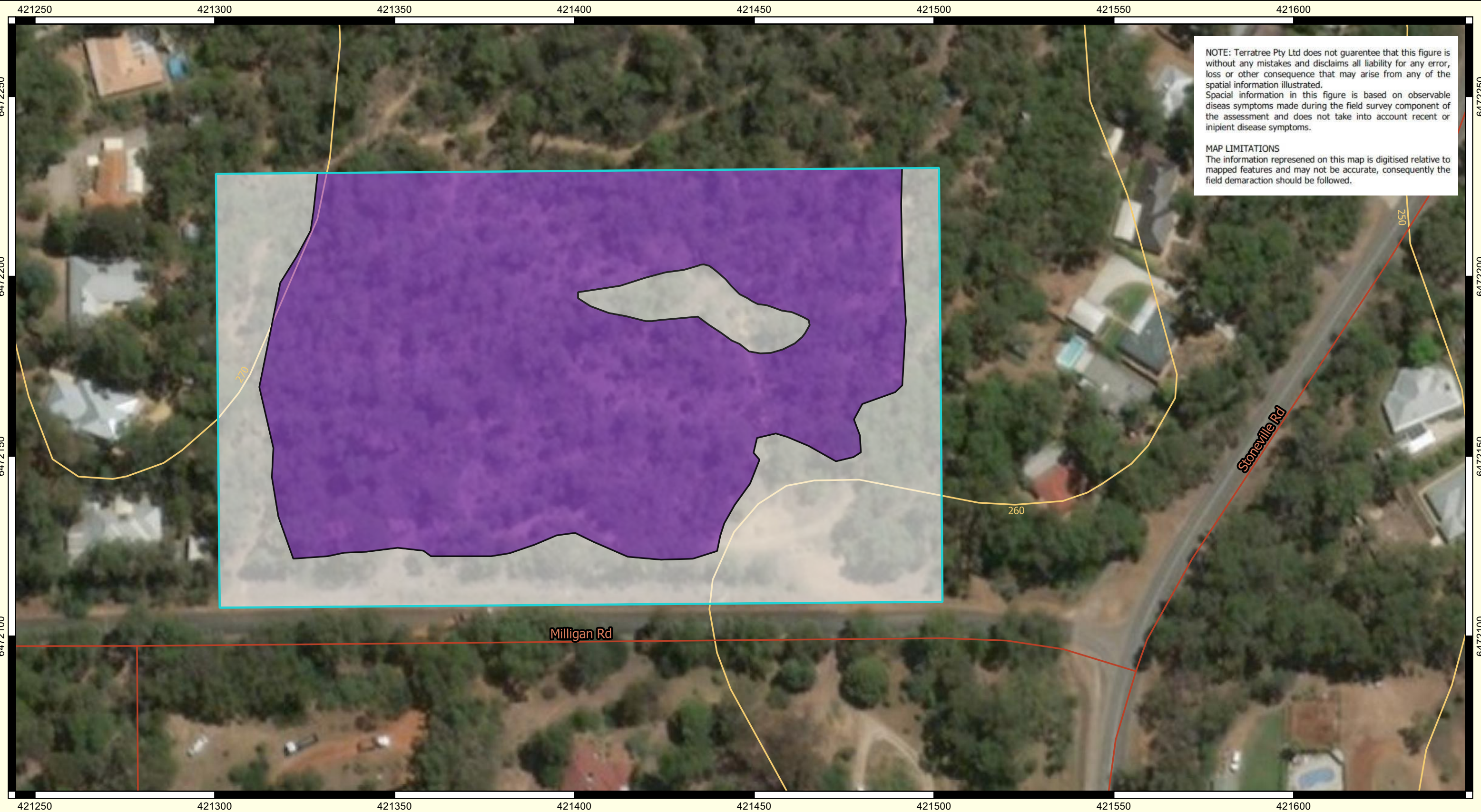
1. Restrict unauthorised vehicle access.
2. Revegetate Excluded (Degraded) areas with resistant species or species that have a low susceptibility to *P. cinnamomi*.






Photo 1: Uninterpretable vegetation at Milligan Road Reserve





Photo 2: Excluded vegetation due to Degraded condition at Milligan Road Reserve



Legend

-  Assessment Area
-  Road Network
-  Contours


Dieback Occurrence

-  Excluded
-  Uninterpretable



Project Location

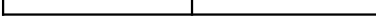
Dieback Occurrence Map Milligan Road Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019



0


25

50 m



Datum: GDA 1994
Projection: MGA Zone 50

Scale: 1:1 000 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	 Terratree
Figure 21	Review: J. Grehan	
	Revision:	

North Darlington Reserves (incl. Nan Macmillan Reserve)

Reserve #: 6922
 2018 Priority: 5
 2019 Ranking: 9
 Area: 36.8 (20.5, 16.3 ha)

Historic Dieback Information

The 2017 Broadscale assessment reported that “Nan Macmillan Park has very active disease and is approximately 70 % infested. The portion south of Oxley Road appears to be Uninfested. The area between Lionel and Darlington Roads is approximately 60 % infested” (Terratree Pty Ltd 2018).

Terratree undertook a separate Dieback assessment of Nan Macmillan Reserve in 2018 and took five samples, four of which tested positive for *Phytophthora cinnamomi*.

There are two historical (2006) positive results for *P. cinnamomi* in North Darlington Reserves in the northern position of the reserve west of Darlington Road.

North Darlington Reserves Dieback Occurrence: Approximately 32 % Infested

Nan McMillan Reserve Occurrence: Approximately 96 % Infested

A large portion, 50.8% (10.4ha) of North Darlington reserve remains Uninfested and protectable. All uninfested areas in Nan Macmillan are Unprotectable due to being surrounded by Infestation.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area	Area (ha)	% of Assessment Area
Reserve	North Darlington Reserves		Nan Macmillan Reserve	
Excluded	2.23	10.90		
Infested	6.53	31.92	15.6	95.65
Uninfested	10.39	50.78		
Uninfested Unprotectable	0.05	0.24	0.71	4.35
Uninterpretable	1.26	6.16		
Total	20.46	100	16.31	100

Sample Results

Sample	Reserve Location	Species	Easting	Northing	Result	Retest Result
SOM19S54	North Darlington (West of Darlington Road)	<i>Xanthorrhoea preissii</i>	412633	6469908	Negative	Negative
SOM19S55	North Darlington (West of Darlington Road)	<i>Xanthorrhoea preissii</i>	412663	6469578	Negative	N/A
SoM1	Nan Macmillan	<i>Banksia squarrosa</i>	413609	6469976	<i>P. cinnamomi</i>	N/A
SoM2	Nan Macmillan	<i>Banksia sessilis</i>	413648	413648	<i>P. cinnamomi</i>	N/A
SoM3	Nan Macmillan	<i>Grevillea wilsonii</i>	413643	6469896	Negative	N/A
SoM4	Nan Macmillan	<i>Banksia sessilis</i>	413336	6469813	<i>P. cinnamomi</i>	N/A
SoM5	Nan Macmillan	<i>Banksia grandis</i>	413430	6469877	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

The 2017 Broadscale assessment reported these observations from the North Darlington and Nan Macmillan Reserves:

“Pollution from drain was evident across the road, and possibly emanating from the water treatment plant. The effluent is killing native vegetation downslope west of Darlington Rd.”

“Nan Macmillan Reserve has very active Dieback. It’s interesting to note the species that are surviving and thriving in the Infested areas. Some of these species such as *Calothamnus* sp. (either *C. quadrifidis* or *C. rupestris*) and *Hakea trifurcata* are providing foraging habitat that has been lost with the *Banksia* spp. succumbing to the pathogen. *Grevillea wilsonii* is also thriving in some areas and offers a significant seed resource from which to collect and propagate” (Terratree Pty Ltd 2018).

Recommended Management Actions

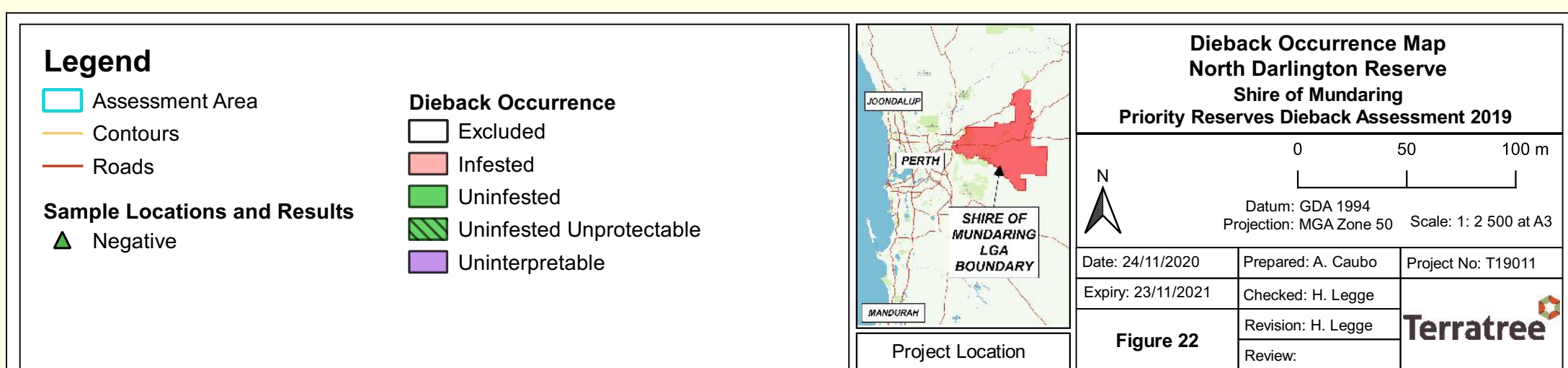
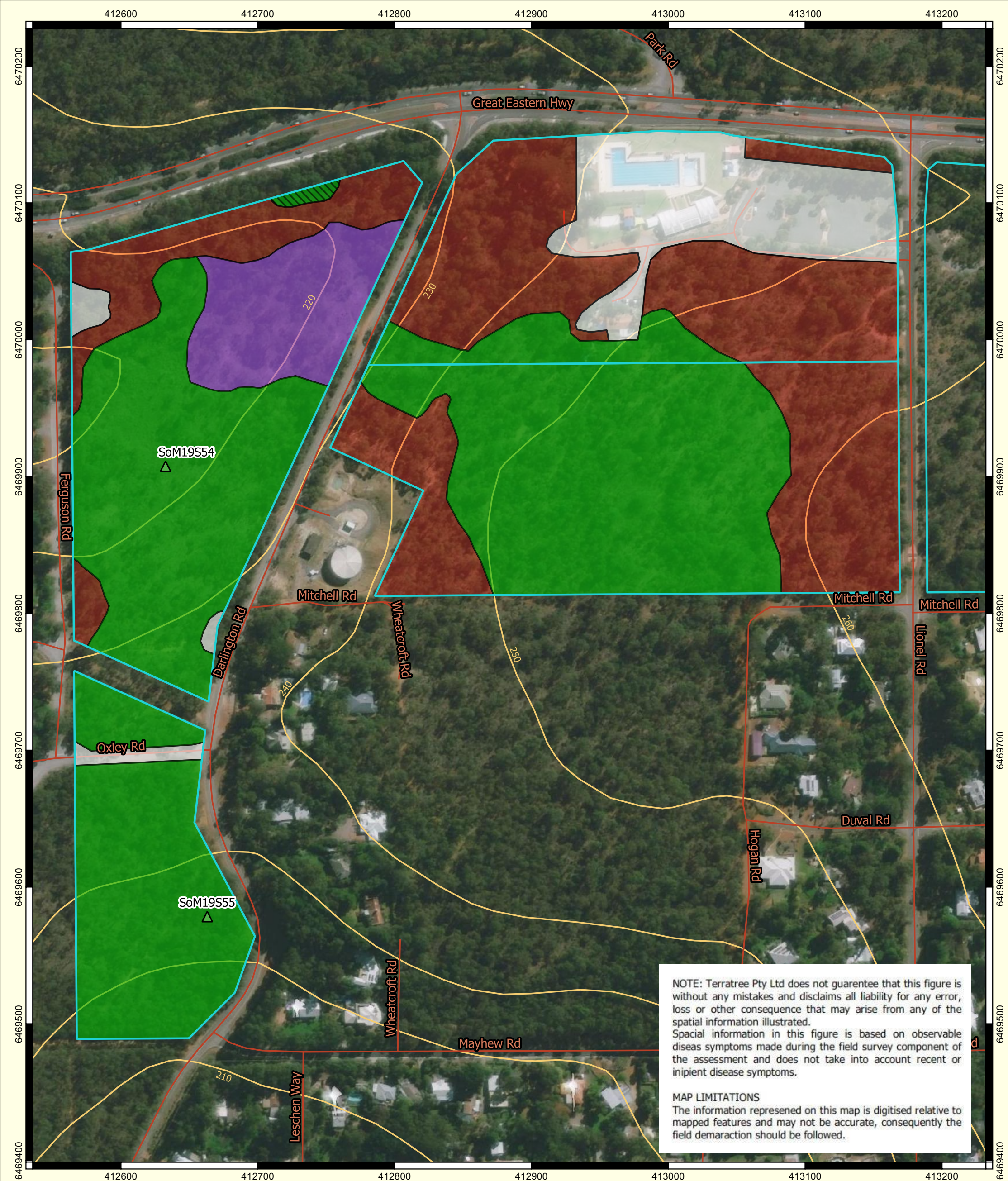
1. Treat buffer at the interface of Infested and Uninfested Protectable areas with phosphite (North Darlington Reserves only).
2. Establish rehabilitation trial plot(s) (Nan Macmillan Reserve only).
3. Install Standard Protocol Dieback Signage (North Darlington Reserves east of Darlington Road only).

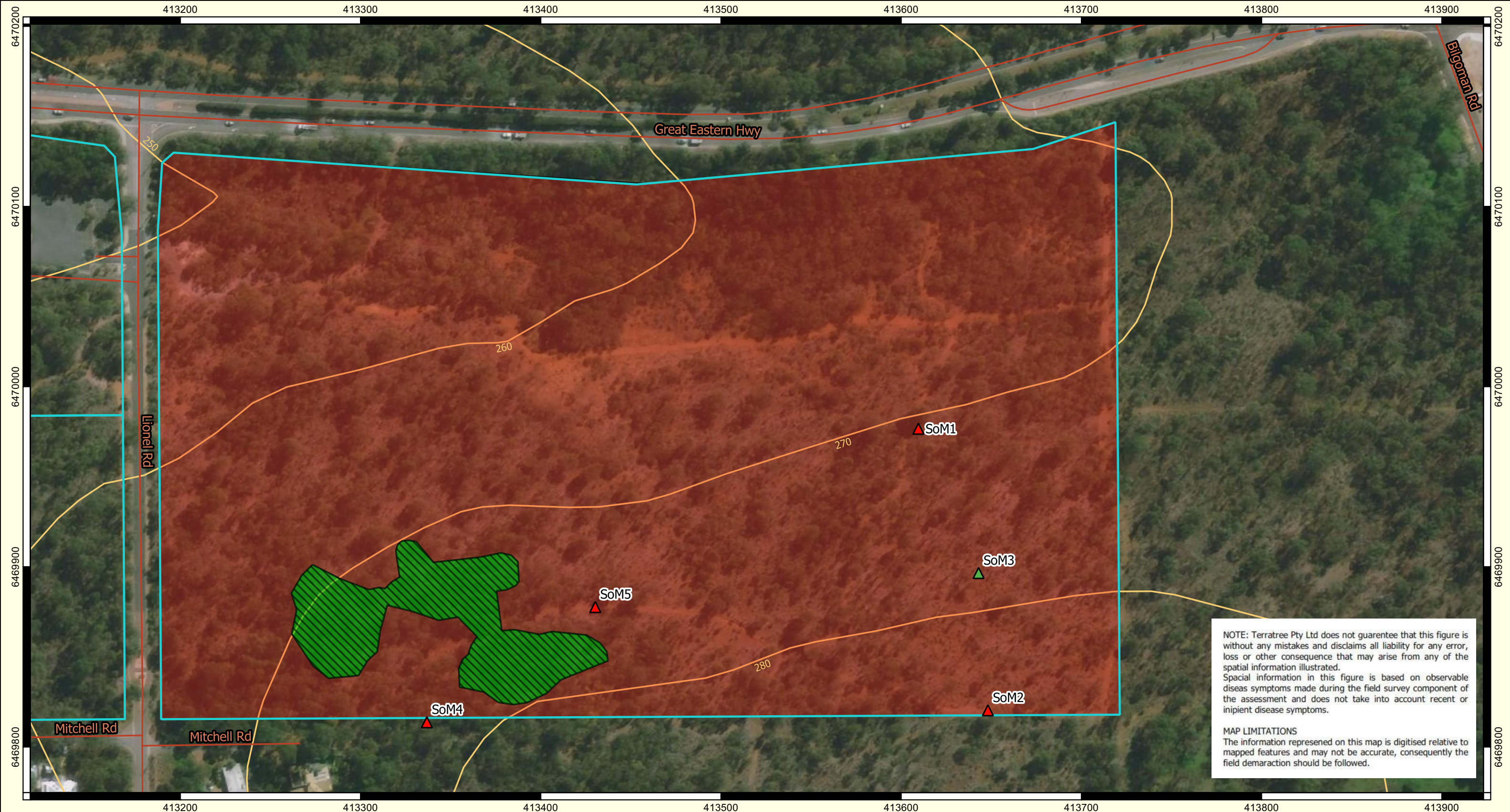


Photo 1: Very active high-impact Dieback at Nan Macmillan Reserve



Photo 2: While the vegetation west of Darlington Road in the North Darlington Reserves is Uninterpretable, the area is likely to be Infested as it adjoins active Dieback with recently dead *Xanthorrhoea preissii*





Legend

- Assessment Area
- Road Network
- Contours

Sample Locations and Results

- Positive: *P. cinnamomi*
- Negative


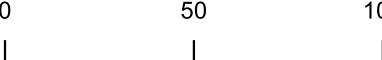

Dieback Occurrence

- Infested
- Uninfested Unprotectable



Project Location

Dieback Occurrence Map Nan Macmillan Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019

 		
Datum: GDA 1994 Projection: MGA Zone 50 Scale: 1:2 000 at A3		
Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	 Terratree
Figure 22b	Review: J. Grehan	
	Revision:	

Old Parkerville School Site

Reserve #: 13214
2018 Priority: 25
2019 Ranking: 29 (Unprotectable)
Area: 1.6 ha

Historic Dieback Information

There is a historical (2001) sample result for *Phytophthora cinnamomi* within 200 m north-east of the site (just south of Parkerville Railway).

Dieback Occurrence: Approximately 43 % Infested

With 43 % of the reserve Infested and 30 % with Degraded vegetation condition, only a very small area (0.13 ha) remains Uninfested. Past community revegetation using resistant and low-susceptibility species has been successful (**Photo 2**) and demonstrates what can be achieved with Dieback Infested sites.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	0.48	30.19
Infested	0.69	43.40
Uninfested Unprotectable	0.13	8.18
Uninterpretable	0.29	18.24
Total	1.59	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S26	<i>Xanthorrhoea gracilis</i>	418182	6472379	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

- Uncontrolled vehicle access is a significant issue in this reserve.

Recommended Management Actions

1. Restrict unauthorised vehicle access.
2. Revegetate Infested and Excluded (Degraded) areas with resistant species or species that have a low susceptibility to *P. cinnamomi*.



Photo 1: Small remaining Uninfested area at the Old Parkerville School Site



Photo 2: Revegetation has restored understory and mid-storey vegetation at the Old Parkerville School Site



NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated.
Spatial information in this figure is based on observable dieback symptoms made during the field survey component of the assessment and does not take into account recent or incipient dieback symptoms.

MAP LIMITATIONS
The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demarcation should be followed.

Legend

Assessment Area

Road Network

Contours

Dieback Occurrence

Excluded

Infested

Uninfested Unprotectable

Uninterpretable

Sample Locations and Results

Positive: *P. cinnamomi*

Dieback Occurrence Map

Old Parkerville School Site

Shire of Mundaring

Priority Reserves Dieback Assessment 2019

02550 m

Datum: GDA 1994
Projection: MGA Zone 50
Scale: 1: 750 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Review: J. Grehan	
	Revision:	

Figure 23

Project Location

Pindalup Reserve

Reserve #: 39853
2018 Priority: 3
2019 Ranking: 2
Area: 40.3 ha

Historic Dieback Information

The 2017 Broadscale assessment reported that the reserve was "Predominantly Uninfested (5 % Infested)" (Terratree Pty Ltd 2018).

Dieback Occurrence: Approximately 1 % Infested

Approximately 88 % of Pindalup Reserve is Uninfested. There is a small infestation running along the side of Dunham Glen. The narrow area to the west of the main reserve is Excluded due to the Degraded vegetation condition.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	4.41	10.94
Infested	0.44	1.09
Uninfested	35.46	87.97
Total	40.31	100

Sample Results

Six samples were taken in Pindalup Reserve with all but one (SoM19S05) returning negative sample results. Death of the plant that returned negative sample results has been attributed to drought.

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S05	<i>Banksia squarrosa</i>	434543	6481028	<i>P. cinnamomi</i>	N/A
SOM19S06	<i>Banksia squarrosa</i>	434128	6481447	Negative	N/A
SOM19S07	<i>Banksia sessilis</i>	434411	6481280	Negative	N/A
SOM19S08	<i>Banksia squarrosa</i>	434304	6481358	Negative	N/A
SOM19S49	<i>Banksia squarrosa</i>	434238	6481389	Negative	N/A
SOM19S50	<i>Banksia squarrosa</i>	434205	6481536	Negative	N/A

Other Comments/Issues

- There is no Standard Protocol Dieback signage in this reserve.
- Unauthorised vehicle access to Pindalup Reserve is a significant issue that compromises the Uninfested status of the reserve.

Recommended Management Actions

1. Treat buffer at the interface of Infested and Uninfested areas along Dunham Glen with phosphite.
2. Review and manage unauthorised vehicle access to the reserve.
3. Install Standard Protocol Dieback Signage.



Photo 1: Uninfested vegetation in Pindalup Reserve



Photo 2: Small infestation running along the side of Dunham Glen that requires phosphite treatment



Legend

- Assessment Area
- Road Network
- Contours

Sample Locations and Results

- Positive: *P. cinnamomi*
- Negative

Dieback Occurrence

- Excluded
- Infested
- Uninfested



Project Location

Dieback Occurrence Map Pindalup Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019



Datum: GDA 1994
Projection: MGA Zone 50
Scale: 1: 4000 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Review: J. Grehan	
	Revision:	

Figure 24

Terratree

Quail Street Reserve

Reserve #: 29269
2018 Priority: 33
2019 Ranking: 4
Area: 105.3 ha

Historic Dieback information

The 2017 Broadscale assessment reported that the reserve had a “very old infestation with mid-storey species missing and evidence of active disease as Dieback moves into mid and upper slope Uninfested remnants” (Terratree Pty Ltd 2018).

Dieback Occurrence: Approximately 78 % infested

Quail Street Reserve has a long history of disturbance including gravel extraction, logging and uncontrolled vehicle access. Approximately 77.6 % of Quail Street Reserve is Infested with very old inactive Dieback observed in the western position of the reserve. Three Uninfested Protectable areas and one very small Uninfested Unprotectable area remain. The Uninfested Protectable areas are all 3-7.5 ha in size while the Unprotectable area is only 0.29 ha and has active disease upslope of it.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Infested	81.7	77.60
Uninfested	23.3	22.13
Uninfested Unprotectable	0.29	0.28
Total	105.29	100

Sample Results

Three of the seven sample returned positive results for *Phytophthora cinnamomi*. Most of the negative samples were taken to ensure that Dieback had not encroached on the remaining Uninfested areas. One sample (SOM19S15) returned a negative result but tested positive for *P. cinnamomi* after re-testing. An additional sample (SOM19S44b) was taken during a group site visit, which also returned a positive result for *P. cinnamomi*.

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S11	<i>Xanthorrhoea preissii</i>	427341	6478186	Negative	Negative
SOM19S12	<i>Xanthorrhoea preissii</i>	427012	6478446	<i>P. cinnamomi</i>	N/A
SOM19S13	<i>Banksia grandis</i>	425873	6478306	Negative	Negative
SOM19S14	<i>Banksia grandis</i>	425890	6477920	Negative	Negative
SOM19S15	<i>Xanthorrhoea preissii</i>	426487	6478128	Negative	<i>P. cinnamomi</i>

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S42	<i>Xanthorrhoea preissii</i>	426844	6477921	Negative	N/A
SOM19S44	<i>Xanthorrhoea gracilis</i>	426135	6477917	<i>P. cinnamomi</i>	N/A
SOM19S44b	<i>Leucopogon propinquus</i>	426853	6478009	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

- A population *Podocarpus drouynianus* s was recorded in an Uninfested portion of the reserve. This population could be range extension for this species' distribution. This species is also highly susceptible to Dieback.
- Quail Street Reserve is the largest reserve within the Shire of Mundaring and is ideal for rehabilitation trials because there are four separate soil and vegetation types within the reserve.
- Erosion is an issue in the eastern portion of the reserve.

Recommended Management & Research Actions

1. Treat buffer at the interface of Infested and Uninfested Protectable areas with phosphite.
2. Review and manage unauthorised vehicle access to the reserve.
3. Undertake baseline flora surveys to quantify species richness and cover, along transects going from Infested to Uninfested in different soil and vegetation types in the reserve, to inform species selection for rehabilitation trails.
4. Establish rehabilitation trial plot(s) in different soil and vegetation types.
5. Install Standard Protocol Dieback Signage.



Photo 1: Old Infested area at Quail Street Reserve being 'masked' by *Bossiaea pulchella*



Photo 2: Very old Infested area at Quail Street Reserve



Photo 3: Active Dieback at Quail Street Reserve at sample site SoMS15, which tested positive for *P. cinnamomi*



Photo 4: Uninfested area at Quail Street Reserve dominated by the highly susceptible species *Podocarpus drouynianus*



Legend

- Assessment Area
- Road Network
- Contours

Sample Locations and Results

- Positive: *P. cinnamomi*
- Negative

Dieback Occurrence

- Infested
- Uninfested
- Uninfested Unprotectable



Project Location

Dieback Occurrence Map Quail Street Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019



0 100 200 m

Datum: GDA 1994
Projection: MGA Zone 50
Scale: 1:5 500 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Review: J. Grehan	
	Revision:	

Figure 25

Terratree



Legend

- Assessment Area
- Road Network
- Contours

Sample Locations and Results

- Positive: *P. cinnamomi*
- Negative

Dieback Occurrence

- Infested
- Uninfested
- Uninfested Unprotectable



Project Location

Dieback Occurrence Map Quail Street Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019



0 100 200 m

Datum: GDA 1994
Projection: MGA Zone 50
Scale: 1:5 500 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Review: J. Grehan	
	Revision:	

Figure 25

Terratree

Railway Reserve, Hovea - Chidlow

Reserve #: 32484
2018 Priority: 13
2019 Ranking: 10
Area: 83.8 ha

Historic Dieback Information

The 2017 Broadscale assessment reported that the reserve was “at least 50 % infested, and that the remaining Uninfested area is too small to be protectable in the long term” (Terratree Pty Ltd 2018).

Historical sample data reveals that there is one positive sample for *Phytophthora cinnamomi* from 2001 just south of the boundary in Parkerville and three positive samples for *P. cinnamomi* from 2007 were taken approximately 320 m south of the boundary in Stoneville. There are also several positive samples from 2006 and 2007 for *P. cinnamomi* north and south of the reserve in Sawyers Valley in private properties.

Dieback Occurrence: Approximately 19 % Infested

The Railway Reserve, Hovea-Chidlow is 19.12 % infested (16 ha), with 10.5 % (8.8 ha) being Uninfested. An area of 29.9ha (36 %) has been Excluded due to the Degraded vegetation condition. Four samples were taken in total with three returning positive results for *P. cinnamomi*.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	29.91	35.71
Infested	16.01	19.12
Not Assessed	1.41	1.68
Temporarily Uninterpretable	0.09	0.11
Uninfested	8.82	10.53
Total	83.75	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S46	<i>Xanthorrhoea preissii</i>	424005	6472498	Negative	<i>P. cinnamomi</i>
SOM19S47	<i>Xanthorrhoea preissii</i>	421762	6472761	Negative	Negative
SOM19S48	<i>Xanthorrhoea preissii</i>	419251	6472435	Negative	<i>P. cinnamomi</i>
SOM19S51	<i>Xanthorrhoea gracilis</i>	417257	6472439	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

- The Threatened species *Acacia aphylla* was recorded between Seaborne Street and Sexton Street.

Recommended Management Actions

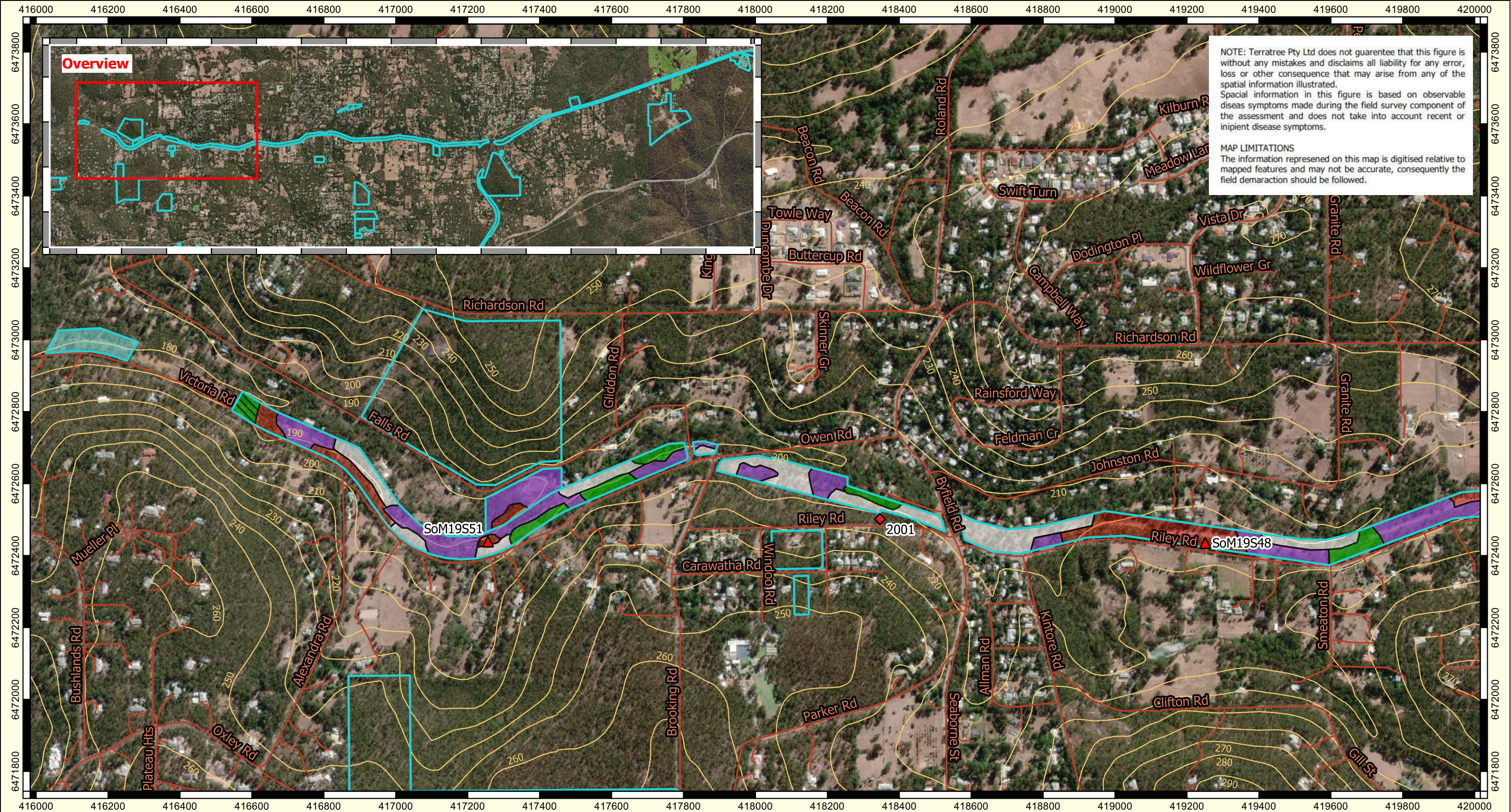
1. Treat buffer at the interface of Infested and Uninfested Protectable areas with phosphite.
2. Revegetate Infested and Excluded (Degraded) areas with resistant species or species that have a low susceptibility to *P. cinnamomi*.



Photo 1: Deaths of *Banksia sessilis* along a cleared firebreak within Railway Reserve, Hovea - Chidlow



Photo 2: Uninfested vegetation within Railway Reserve, Hovea - Chidlow



NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated. Spatial information in this figure is based on observable dieback symptoms made during the field survey component of the assessment and does not take into account recent or inipient disease symptoms.

MAP LIMITATIONS
The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demarcation should be followed.

Legend

Assessment Area

Road Network

Contours

Sample Locations and Results

Positive: *P. cinnamomi*

Negative

Historical Positive

Dieback Occurrence

Not Assessed

Excluded

Infested

Uninfested

Uninfested Unprotectable

Uninterpretable

Project Location

Dieback Occurrence Map

Railway Reserve - Hovea to Chidlow

Shire of Mundaring

Priority Reserves Dieback Assessment 2019

0

250

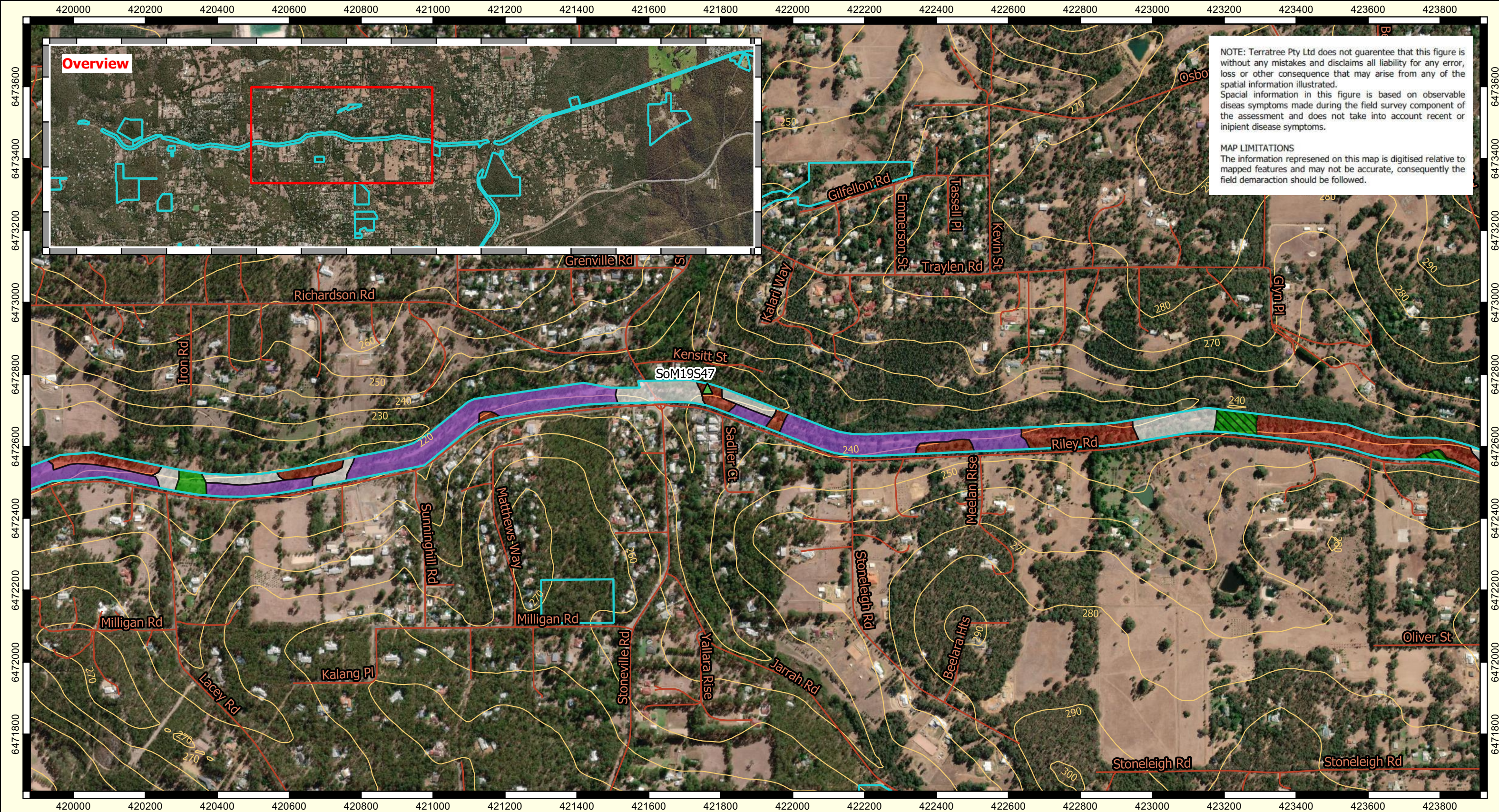
500 m

N

Datum: GDA 1994
Projection: MGA Zone 50
Scale: 1:10 000 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Review: J. Grehan	
	Revision:	

Figure 25a



Legend

- Assessment Area
- Road Network
- Contours

Sample Locations and Results

- Negative




Dieback Occurrence

- Excluded
- Infested
- Uninfested
- Uninfested Unprotectable
- Uninterpretable



Project Location

Dieback Occurrence Map Railway Reserve - Hovea to Chidlow Shire of Mundaring Priority Reserves Dieback Assessment 2019

<div><div><div>N</div></div><div><div>0</div><div>250</div><div>500 m</div></div></div> <div><div>Datum: GDA 1994</div><div>Projection: MGA Zone 50</div><div>Scale: 1:10 000 at A3</div></div>		
Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	<div> Terratree</div>
Figure 25b	Review: J. Grehan	
	Revision:	



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MAP LIMITATIONS
The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demarcation should be followed.

Legend

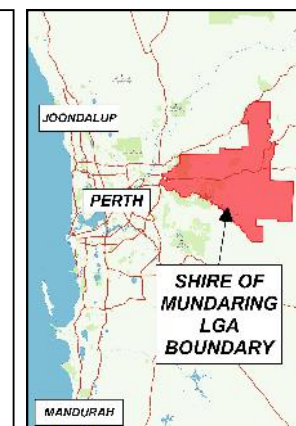
- Assessment Area
- Road Network
- Contours

Sample Locations and Results

- Positive: *P. cinnamomi*

Dieback Occurrence

- Excluded
- Infested
- Uninfested
- Uninfested Unprotectable
- Uninterpretable



Project Location

Dieback Occurrence Map Railway Reserve - Hovea to Chidlow Shire of Mundaring Priority Reserves Dieback Assessment 2019









0250500 m		
Datum: GDA 1994 Projection: MGA Zone 50 Scale: 1:10 000 at A3		
Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
Figure 25c	Review: J. Grehan	Terratree
	Revision:	



NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated. Spatial information in this figure is based on observable disease symptoms made during the field survey component of the assessment and does not take into account recent or inipient disease symptoms.

MAP LIMITATIONS
The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demarcation should be followed.




Legend

-  Assessment Area
 -  Road Network
 -  Contours
- Dieback Occurrence**
-  Excluded
 -  Infested
 -  Temporarily Uninterpretable
 -  Uninfested
 -  Uninterpretable



Project Location

Dieback Occurrence Map Railway Reserve - Hovea to Chidlow Shire of Mundaring Priority Reserves Dieback Assessment 2019

<div><div><div>N</div></div><div><div>0</div><div>250</div><div>500 m</div></div></div> <div>Datum: GDA 1994 Projection: MGA Zone 50 Scale: 1:10 000 at A3</div>		
Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	<div> Terratree</div>
Figure 25d	Review: J. Grehan	
	Revision:	

Roland Road Reserve

Reserve #: 45986

2018 Priority: 24

2019 Ranking: 26

Area: 1.5 ha

Historic Dieback Information

The 2017 Broadscale assessment reported that the reserve was “approximately 30% infested.” (Terratree Pty Ltd 2018) Historical sample data reveals that there several positive samples from 2016 for *Phytophthora cinnamomi* west of the reserve.

Dieback Occurrence: Approximately 43 % Infested

While the reserve is 43.3 % (0.65 ha) Infested, it may be contiguous with a larger Uninfested area on adjacent private land.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	0.13	8.67
Infested	0.65	43.33
Uninfested	0.07	4.67
Uninfested Unprotectable	0.65	43.33
Total	1.50	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S24	<i>Xanthorrhoea gracilis</i>	417639	6477124	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

Nil

Recommended Management Actions

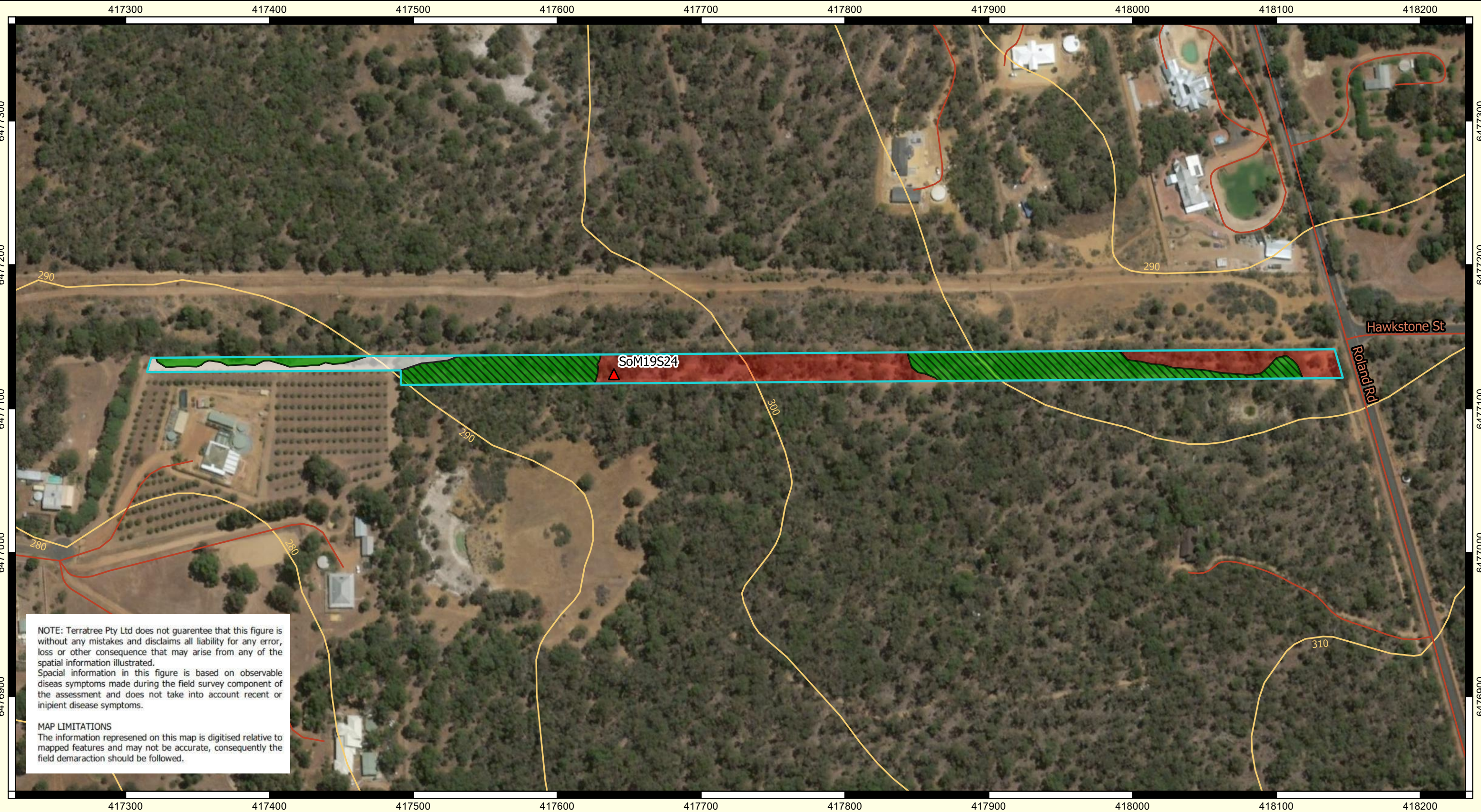
1. Treat buffer at the interface of Infested and Uninfested with phosphite.



Photo 1: Infested vegetation within Roland Road Reserve



Photo 2: Uninfested vegetation within Roland Road Reserve



Legend

Assessment Area

Road Network

Contours

Dieback Occurrence

Excluded

Infested

Uninfested

Uninfested Unprotectable

Sample Locations and Results

Positive: *P. cinnamomi*

Project Location

Dieback Occurrence Map Roland Road Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019

N

050100 m

Datum: GDA 1994
Projection: MGA Zone 50
Scale: 1:2 500 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Review: J. Grehan	
	Revision:	

Figure 27

Rosedale Road Reserve

Reserve #: 22659

2018 Priority: 15

2019 Ranking: 19

Area: 1.0 ha

Historic Dieback Information

The 2017 Broadscale assessment reported that the reserve was Uninfested (Terratree Pty Ltd 2018).

Dieback Occurrence: Approximately 20 % Infested

Most of the reserve (80 %) is Uninfested. Dieback infestations were found in the north-western and south-eastern corners. It was evident during the 2019 assessment that Dieback had been introduced along a trench line excavated for the NBN. Plants along the trench line were observed to be dead and dying. A sample taken of a recently dead *Xanthorrhoea preissii* immediately adjacent to the trench returned a positive result for *Phytophthora cinnamomi*. Approximately 20 % of the reserve is now Infested.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Infested	0.20	19.8
Uninfested Protectable	0.81	80.2
Total	1.01	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S19	<i>Xanthorrhoea preissii</i>	430122	6475400	Negative	<i>P. cinnamomi</i>

Other Comments/Issues

Nil

Recommended Management Actions

1. Treat buffer at the interface of Infested and Uninfested areas with phosphite.
2. Review and manage unauthorised vehicle access to the reserve.
3. Install Standard Protocol Dieback Signage.



Photo 1: Trench line dug by NBN contractors through Rosedale Reserve



Photo 2: Recently dead *Xanthorrhoea preissii* immediately adjacent to the NBN trench that tested positive for *P. cinnamomi*



Legend

- Assessment Area
- Road Network
- Contours

Dieback Occurrence

- Infested
- Uninfested

Sample Locations and Results

- Positive: *P. cinnamomi*

Project Location

Dieback Occurrence Map Rosedale Road Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019

0 25 50 m

Datum: GDA 1994
Projection: MGA Zone 50
Scale: 1:750 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Review: J. Grehan	
	Revision:	

Figure 28

Sexton Street Reserve

Reserve #: 10924

2018 Priority: 12

2019 Ranking: 18

Area: 3 ha

Historic Dieback Information

The 2017 Broadscale assessment reported that the reserve was approximately 40 % Infested (Terratree Pty Ltd 2018).

Dieback Occurrence: Approximately 41 % Infested

While 40.8% (1.21 ha) of the reserve is Infested, 48.65 % (1.44 ha) is Uninfested and may be contiguous with a larger Uninfested area on adjacent private land. A smaller area, of 0.31 ha (10.47 %) is Unprotectable.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Infested	1.21	40.88
Uninfested	1.44	48.65
Uninfested Unprotectable	0.31	10.47
Total	2.96	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S33	<i>Banksia grandis</i>	424008	6472302	Negative	N/A

Other Comments/Issues

Nil

Recommended Management Actions

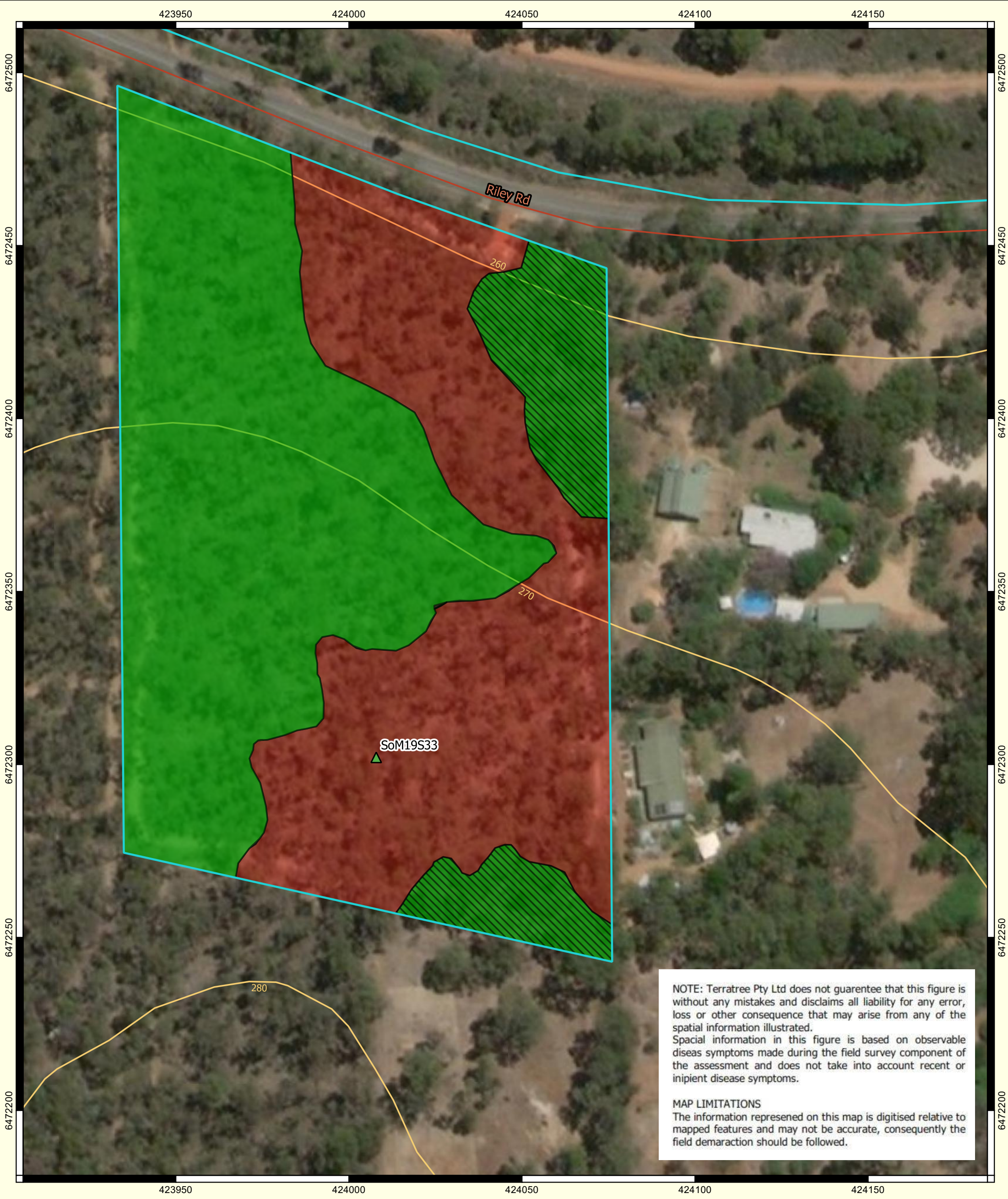
1. Treat buffer at the interface of Infested and Uninfested areas with phosphite.
2. Install Standard Protocol Dieback Signage.



Photo 1: Infested vegetation with recently dead *Banksia grandis* within Sexton Street Reserve



Photo 2: Uninfested vegetation within Sexton Street Reserve



Legend

- Assessment Area
- Contours
- Roads

Dieback Occurrence

- Infested
- Uninfested
- Uninfested Unprotectable

Sample Locations and Results

- Negative

Project Location

Dieback Occurrence Map Sexton Street Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019

0 25 50 m

Datum: GDA 1994
Projection: MGA Zone 50 Scale: 1: 1 000 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project No: T19011
Expiry: 23/11/2021	Checked: H. Legge	Terratree
	Revision: H. Legge	
Review:		

Figure 29

Southern Railway Heritage Trail, Boya - Mundaring

Reserve #: 31196
2018 Priority: 20
2019 Ranking: 14
Area: 101.7 ha

Historic Dieback Information

The 2017 Broadscale assessment reported that the reserve had “evidence of Dieback recorded at regular intervals along the trail” (Terratree Pty Ltd 2018). Historical sample data reveals that there are positive samples for *Phytophthora cinnamomi* from 2001 in Boya, within Greenmount National Park (2006), and the section of Heritage Trail that traverses Binbrook Reserve and the Superblock. There are also two historical positive samples for *P. cinnamomi* in Glen Forrest (2004) on private properties north of trail and west of Hardey Road.

Dieback Occurrence: Approximately 41 % Infested

Approximately 41 % of the Southern Railway Heritage Trail is Infested and only 3% Uninfested protectable with a further 1.7 % Uninfested Unprotectable. The remaining 15 % is Uninterpretable and Excluded (40 %) due to the Degraded vegetation condition in some areas. The Uninterpretable vegetation within the reserve is found where the trail traverses low lying areas dominated by resistant species such as Flooded Gums (*Eucalyptus rudis*), Cyperaceae, Juncaceae, *Melaleuca*, *Kunzea* and *Regelia* species.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	40.2	39.52
Infested	41.39	40.69
Uninfested	3.29	3.23
Uninfested Unprotectable	1.75	1.72
Uninterpretable	15.1	14.84
Total	101.73	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S37	<i>Xanthorrhoea preissii</i>	425331	6470714	<i>P. cinnamomi</i>	N/A
SOM19S38	<i>Xanthorrhoea gracilis</i>	422738	6470062	<i>P. cinnamomi</i>	N/A
SOM19S39	<i>Xanthorrhoea gracilis</i>	422112	6469592	<i>P. cinnamomi</i>	N/A
SOM19S40	<i>Xanthorrhoea preissii</i>	416205	6469096	<i>P. cinnamomi</i>	N/A
SOM19S41	<i>Xanthorrhoea gracilis</i>	410314	6469208	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

Nil

Recommended Management Actions

1. Treat buffer at the interface of Infested and Uninfested Protectable areas with phosphite.
2. Revegetate Infested and Excluded (Degraded) areas with resistant species or species that have a low susceptibility to *P. cinnamomi*.



Photo 1: Uninfested vegetation along the Southern Railway Heritage Trail, Boya - Mundaring



Photo 2: Infested area along the Southern Railway Heritage Trail, Boya – Mundaring, being ‘masked’ through colonisation with resistant rushes and sedges. Note the recently dead *Xanthorrhoea gracilis* in the foreground.



Photo 3: Uninterpretable vegetation in a depression along the Southern Railway Heritage Trail, Boya – Mundaring



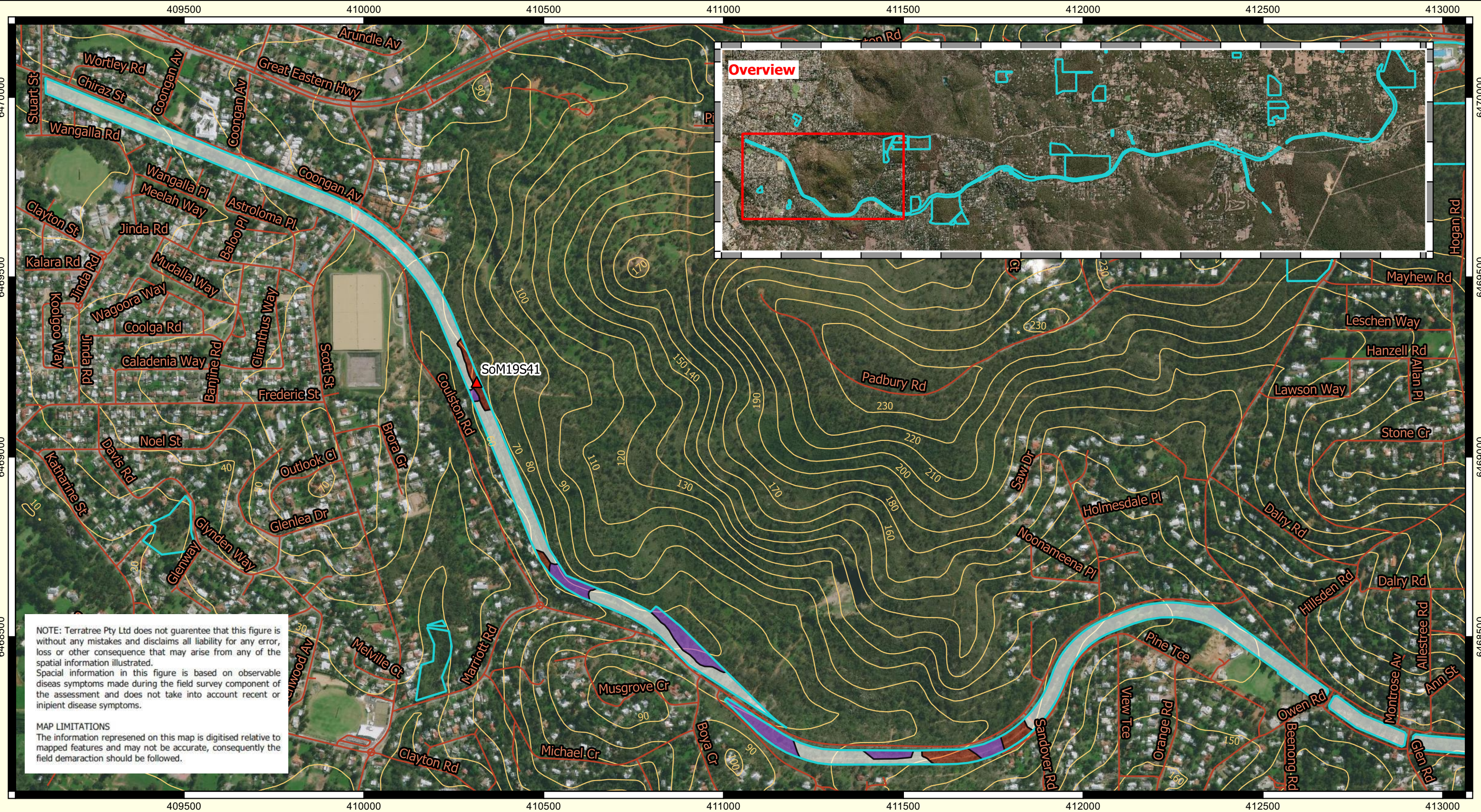
Photo 4: Uninterpretable vegetation along the Southern Railway Heritage Trail, Boya – Mundaring dominated by *Melaleuca* sp. and *Calothamnus* sp. that have a low susceptibility to the pathogen



Photo 5: Example of Excluded vegetation along the Southern Railway Heritage Trail, Boya – Mundaring, which is in Degraded vegetation condition due to invasion by exotic species



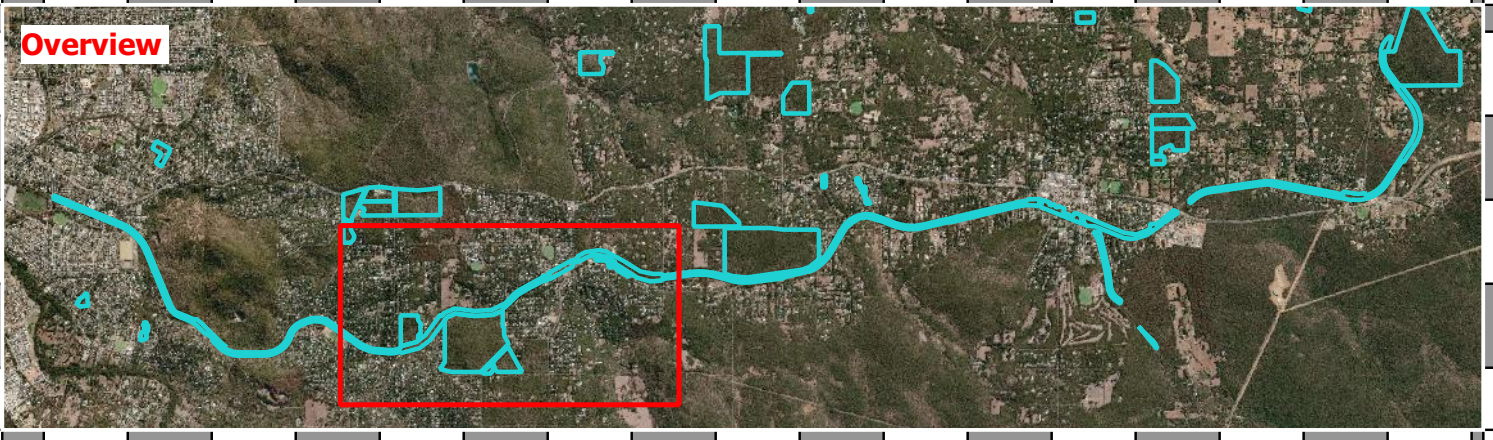
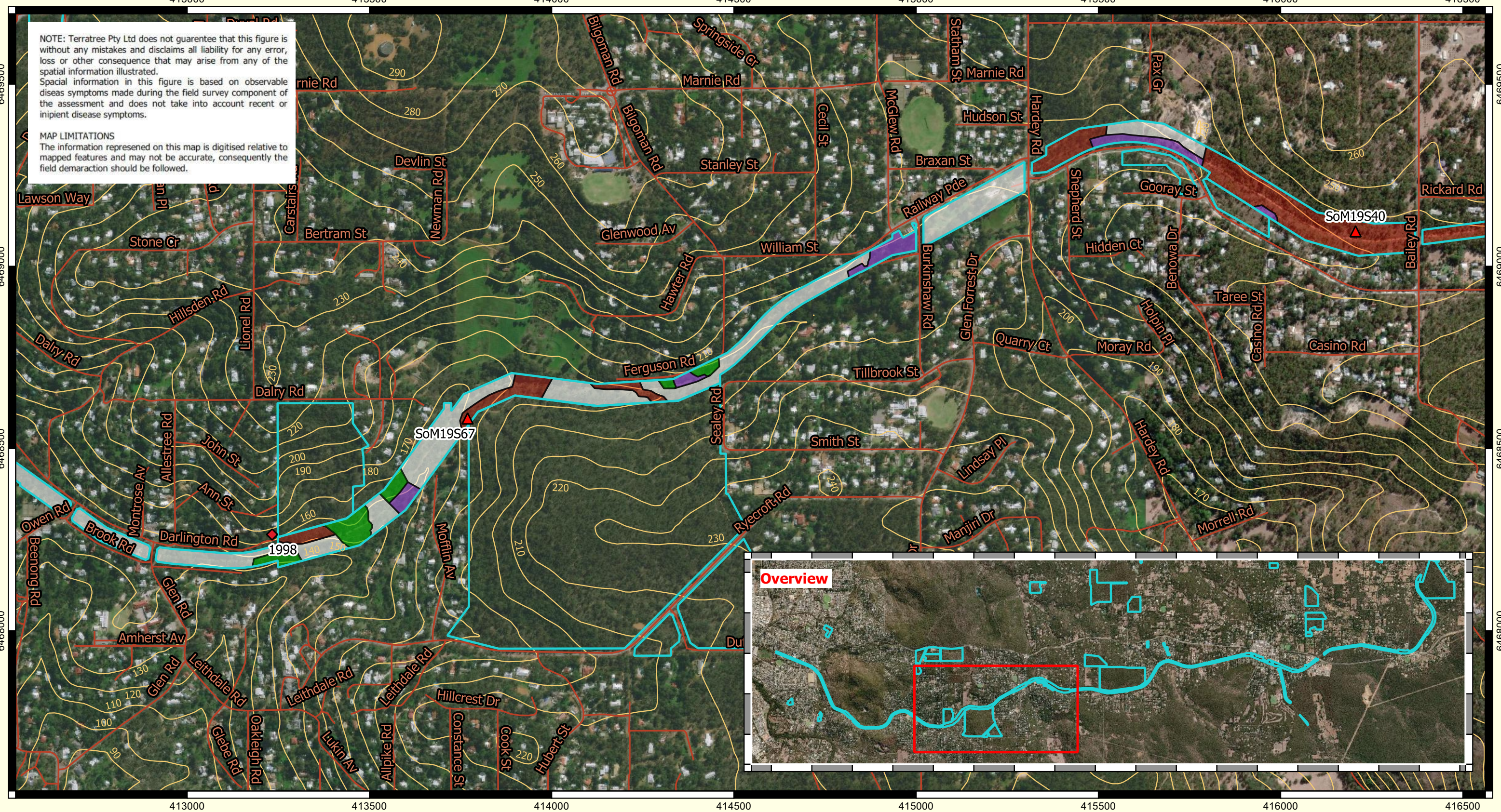
Photo 6: Another example of an Excluded area along the Southern Railway Heritage Trail, Boya – Mundaring, which is in Degraded vegetation condition.



NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated.

MAP LIMITATIONS

The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demaraction should be followed.



Legend

- Assessment Area
- Road Network
- Contours

Sample Locations and Results

- Positive: *P. cinnamomi*
- Historical Positive

Dieback Occurrence

- Excluded
- Infested
- Uninfested
- Uninterpretable



Dieback Occurrence Map
Southern Railway Heritage Trail, Boya - Mundaring
Shire of Mundaring
Priority Reserves Dieback Assessment 2019

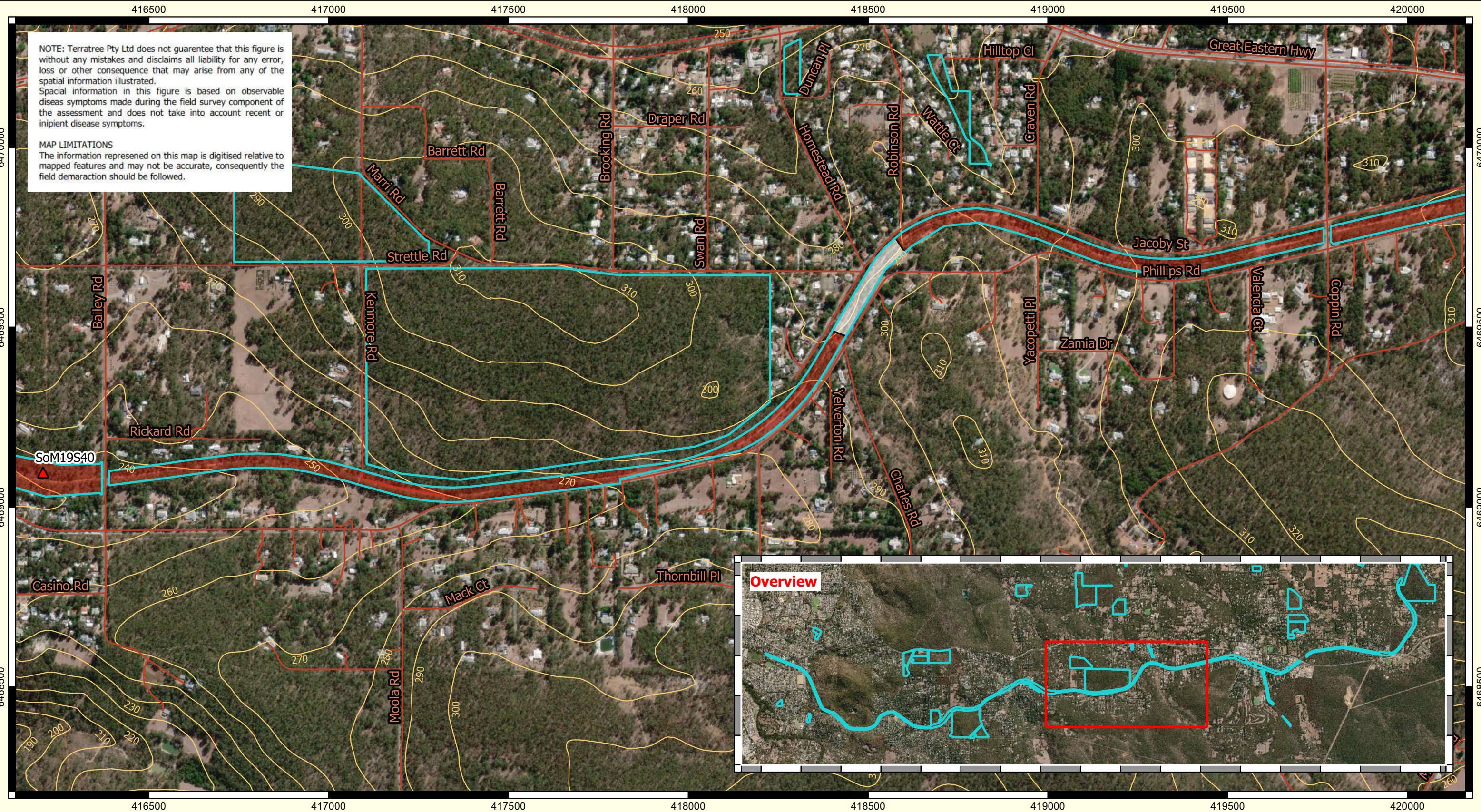
0 250 500 m

Datum: GDA 1994
Projection: MGA Zone 50
Scale: 1:10 000 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Review: J. Grehan	
	Revision:	

Figure 30b

Terratree

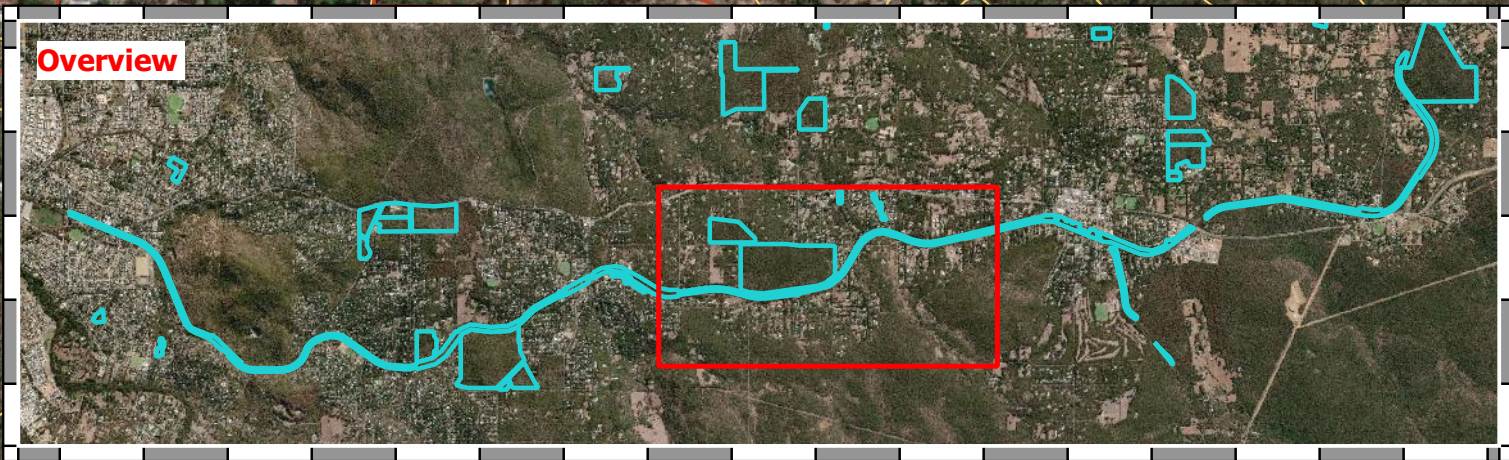


NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated.

Spacial information in this figure is based on observable disease symptoms made during the field survey component of the assessment and does not take into account recent or inipient disease symptoms.

MAP LIMITATIONS

The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demaraction should be followed.



Legend

- Assessment Area
- Road Network
- Contours

Dieback Occurrence

- Excluded
- Infested

Sample Locations and Results

- Positive: *P. cinnamomi*



Project Location

Dieback Occurrence Map Southern Railway Heritage Trail, Boya - Mundaring Shire of Mundaring Priority Reserves Dieback Assessment 2019

0 250 500 m



Datum: GDA 1994
Projection: MGA Zone 50
Scale: 1:10 000 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
Figure 30c	Review: J. Grehan	
	Revision:	




Terratree



NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated.
Spatial information in this figure is based on observable dieback symptoms made during the field survey component of the assessment and does not take into account recent or incipient dieback symptoms.

MAP LIMITATIONS
The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demarcation should be followed.






Legend

-  Assessment Area
-  Road Network
-  Contours

Sample Locations and Results

-  Positive: *P. cinnamomi*

Dieback Occurrence

-  Excluded
-  Infested
-  Uninfested
-  Uninfested Unprotectable
-  Uninterpretable



Project Location

Dieback Occurrence Map Southern Railway Heritage Trail, Boya - Mundaring Shire of Mundaring Priority Reserves Dieback Assessment 2019

0 250 500 m

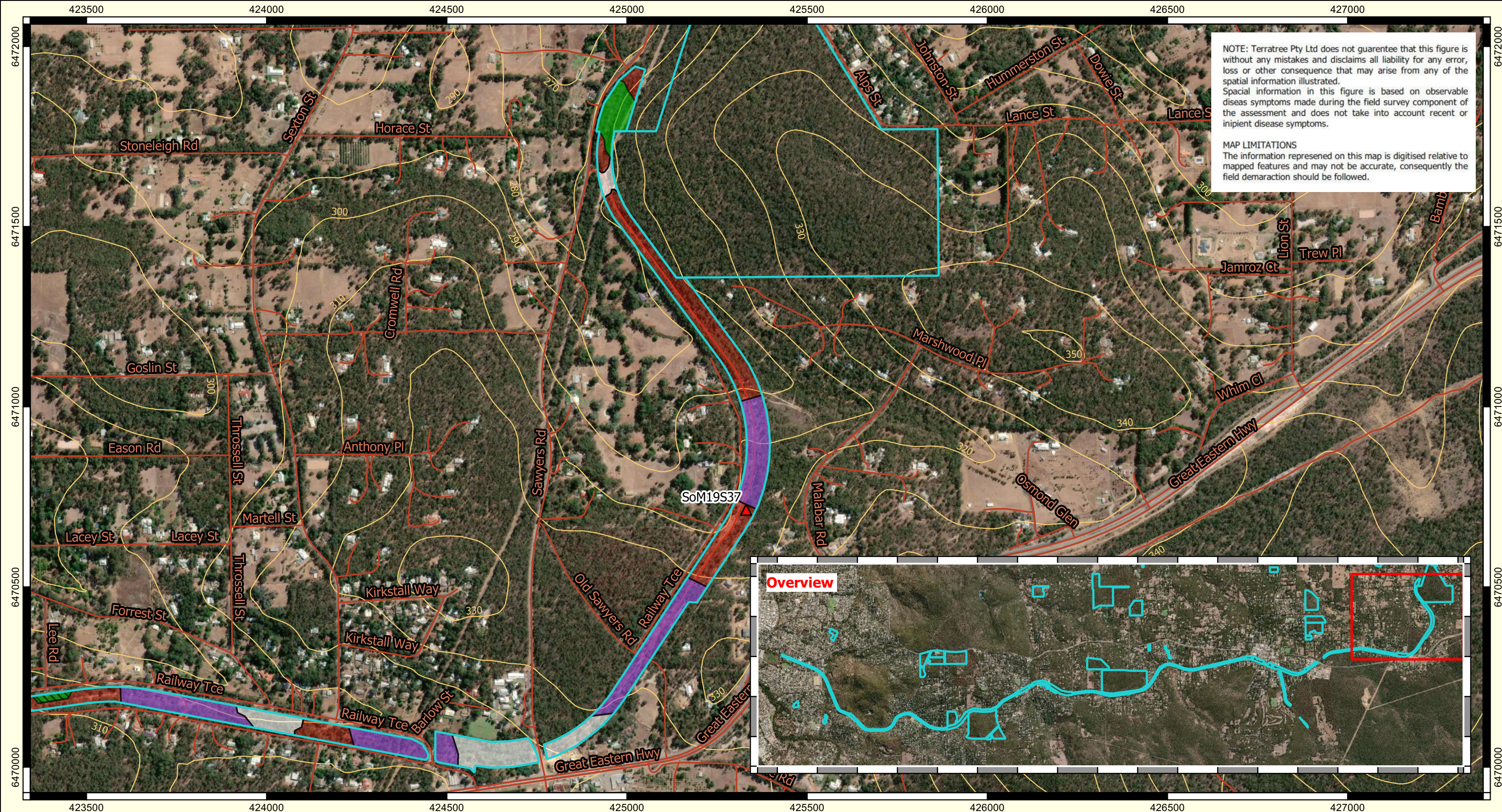


Datum: GDA 1994
Projection: MGA Zone 50
Scale: 1:10 000 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Review: J. Grehan	
	Revision:	

Figure 30d

Terratree



Legend

- Assessment Area
- Road Network
- Contours

Sample Locations and Results

- Positive: *P. cinnamomi*

Dieback Occurrence

- Excluded
- Infested
- Uninfested
- Uninterpretable



Project Location

Dieback Occurrence Map Southern Railway Heritage Trail, Boya - Mundaring Shire of Mundaring Priority Reserves Dieback Assessment 2019

0 250 500 m



Datum: GDA 1994
Projection: MGA Zone 50
Scale: 1:10 000 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Review: J. Grehan	
	Revision:	

Figure 30e

Terratree

Strettle Road Reserve

Reserve #: 32727
2018 Priority: 2
2019 Ranking: 5
Area: 70.8 ha

Historic Dieback Information

The 2017 Broadscale assessment reported the “smaller north-western portion approximately 80 % Infested and the larger southern portion approximately 50 % infested”. (Terratree Pty Ltd 2018).

There is a historical (2018) positive result for *Phytophthora cinnamomi* in the north of the larger southern portion of the reserve and several historical (2004 and 2005) positive results in the north-east of the smaller northern portion of the reserve.

Dieback Occurrence: Approximately 70 % Infested

While approximately 70 % of the overall reserve is Infested, the small (2.12ha) Uninfested area in the northern portion of the reserve, north of Strettle Road, is Unprotectable due to its narrow shape and landscape position being largely downslope of an infestation. The larger southern portion of the reserve, south of Strettle Road, has a large Uninfested area (19.34ha, 27 %) that is Protectable but will require regular treatment with phosphite.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Infested	49.33	69.68
Uninfested	19.34	27.32
Uninfested Unprotectable	2.12	2.99
Total	70.79	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S29	<i>Banksia grandis</i>	417386	6469336	Negative	Negative
SOM19S30	<i>Banksia grandis</i>	417064	6469869	<i>P. cinnamomi</i>	N/A
SOM19S31	<i>Banksia grandis</i>	417819	6469414	Negative	Negative
SoM19S52	<i>B. sessilis</i> & <i>Xanthorrhoea gracilis</i>	417749	6469579	<i>P. cinnamomi</i>	N/A
SOM19S53	<i>Xanthorrhoea preissii</i>	417225	6469133	Negative	<i>P. cinnamomi</i>

Other Comments/Issues

- There are piles of old asbestos adjacent to the southern boundary track of the northern portion of the reserve, north of Strettle Road.

Recommended Management & Research Actions

1. Treat buffer at the interface of Infested and Uninfested Protectable areas with phosphite.
2. Review and manage unauthorised vehicle access to the reserve.
3. Undertake baseline flora surveys to quantify species richness and cover, along transects going from Infested to Uninfested in different soil and vegetation types in the reserve, to inform species selection for rehabilitation trails.
4. Establish rehabilitation trial plot(s) in different soil and vegetation types.
5. Review Dieback signage in the reserve to ensure that it is correctly placed and adequate.



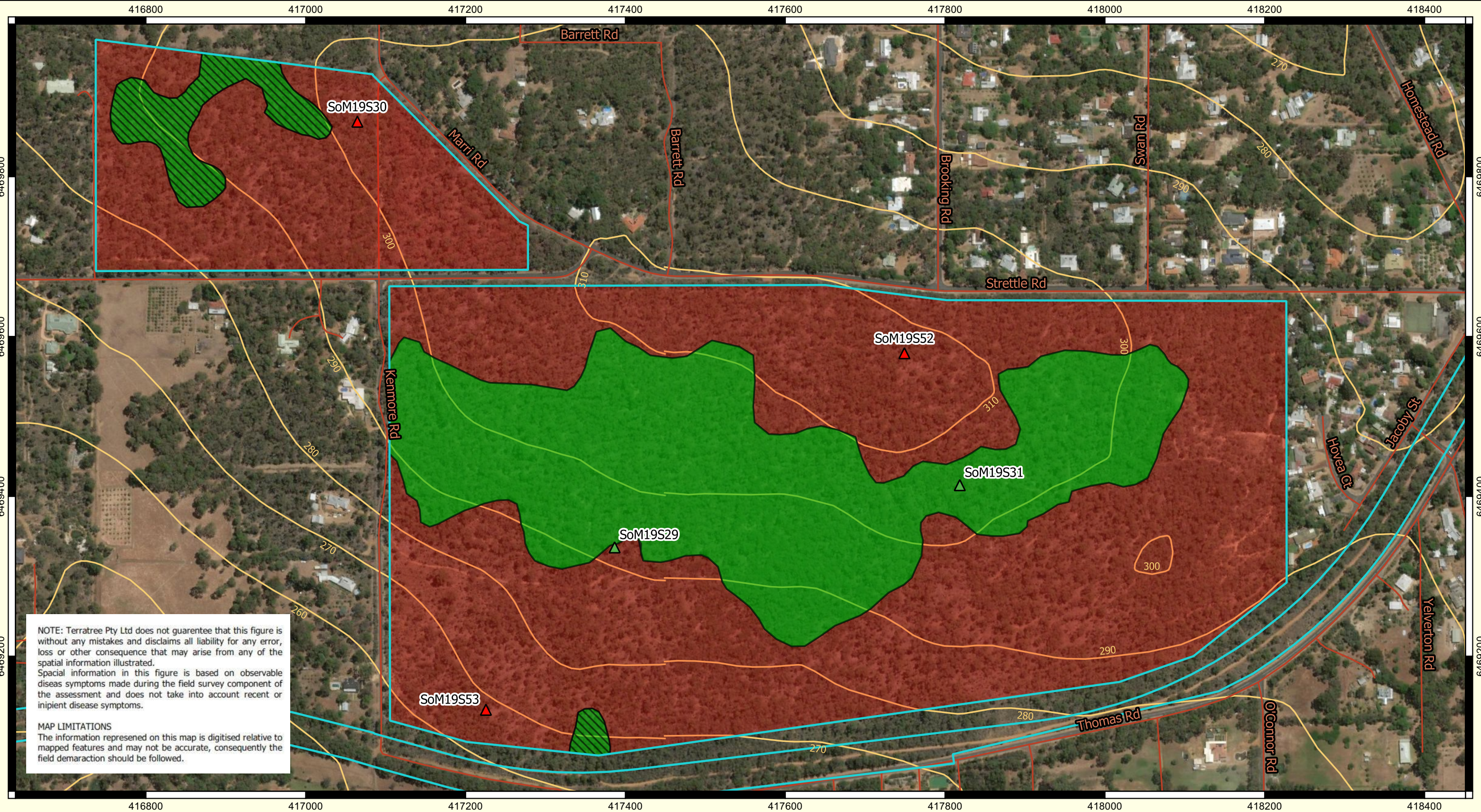
Photo 1: Uninfested vegetation within Strettle Road Reserve



Photo 2: Active disease edge with recently dead *Banksia grandis* within Strettle Road Reserve



Photo 3: Old Infested area with significant missing mid-storey and substantial biomass reduction within Strettle Road Reserve



NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated. Spatial information in this figure is based on observable disease symptoms made during the field survey component of the assessment and does not take into account recent or inipient disease symptoms.

MAP LIMITATIONS
The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demarcation should be followed.

Legend

Assessment Area

Road Network

Contours

Dieback Occurrence

Infested

Uninfested

Uninfested Unprotectable

Sample Locations and Results

Positive: *P. cinnamomi*

Negative

Project Location

Dieback Occurrence Map Strettle Road Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019

0100200 m

Datum: GDA 1994
Projection: MGA Zone 50
Scale: 1:4 500 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Review: J. Grehan	
	Revision:	

Figure 31

Terratree

Superblock (incl. previous wildflower seed reserve 36428)

Reserve #: 50018
2018 Priority: 4
2019 Ranking: 3
Area: 51.3 ha

Historic Dieback Information

The 2017 Broadscale assessment reported that there was “significant active disease along Ryecroft Road, which is an upslope infestation, otherwise disease is concentrated in lower slopes and gullies” and “the Wildflower Seed Reserve is 90 % infested” (Terratree Pty Ltd 2018).

There are two historical positive results for *Phytophthora cinnamomi* from 2002 south of the main block (north of Ryecroft Road), one positive result from 2004 on the eastern boundary close to the Southern Heritage Railway Trail, and two positive results to the east of the Superblock (2002 and 2004).

Dieback Occurrence: Approximately 35 % Infested

The smaller portion of the Superblock, south-east of Ryecroft Road, is almost entirely Infested. There is a large Uninfested Protectable area in excess of 30 ha (59 %) in the larger portion north of Ryecroft Road. Although disease was reported to be very active in the larger portion of the reserve along Ryecroft Road in 2017, the activity has now subsided. This is due to phosphite treatment undertaken in early 2019 along the Uninfested buffer, which has stopped the progression of Dieback upslope of Ryecroft Road.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	1.76	3.43
Infested	17.97	35.04
Uninfested	30.03	58.56
Uninfested Unprotectable	0.29	0.57
Uninterpretable	1.23	2.40
Total	51.28	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S67	<i>Xanthorrhoea preissii</i>	413770	6468583	<i>P. cinnamomi</i>	N/A
SOM19S68	<i>Xanthorrhoea gracilis</i>	413842	6468387	Negative	N/A
SOM19S69	<i>Xanthorrhoea gracilis</i>	414400	6468068	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

- signage is inadequate and some has been vandalised.
- Public vehicular access is a significant hygiene issue.

Recommended Management & Research Actions

1. Treat buffer at the interface of Infested and Uninfested Protectable areas with phosphite.
2. Undertake baseline flora surveys to quantify species richness and cover, along transects going from Infested to Uninfested in different soil and vegetation types in the reserve, to inform species selection for rehabilitation trails.
3. Establish rehabilitation trial plot(s) in different soil and vegetation types.
4. Install Standard Protocol Dieback Signage.



Photo 1: Active Dieback disease on Ryecroft Road in the Superblock (2017) with recently dead *Xanthorrhoea preissii*



Photo 2: Active Dieback disease along Ryecroft Road in the Superblock (2017) with recently dead *Banksia sessilis*



Photo 3: Uninfested area within the Superblock



Photo 4: Old Infested area within the Superblock with substantial biomass reduction

413800

414000

414200

414400

414600

NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated.
Spatial information in this figure is based on observable disease symptoms made during the field survey component of the assessment and does not take into account recent or inipient disease symptoms.

MAP LIMITATIONS

The information represented on this map is digitised relative to mapped features and may not be accurate, consequently the field demaraction should be followed.

SoM19S67

SoM19S68

SoM19S69

Legend

Assessment Area

Contours

Roads

Sample Locations and Results

Positive: *P. cinnamomi*

Negative

Dieback Occurrence

Excluded

Infested

Uninfested

Uninfested Unprotectable

Uninterpretable



Project Location

Dieback Occurrence Map
Superblock (incl. wildflower reserve)
Shire of Mundaring
Priority Reserves Dieback Assessment 2019

0 100 200 m

Datum: GDA 1994
Projection: MGA Zone 50 Scale: 1:4 000 at A3

Date: 24/11/2020

Prepared: A. Caubo

Project No: T19011

Expiry: 23/11/2021

Checked: H. Legge

Revision: H. Legge

Review:

Figure 32

Terratree

Thomas Street Reserve

Reserve #: 31066

2018 Priority: 16

2019 Ranking: 25

Area: 1.8 ha

Historic Dieback Information

The 2017 Broadscale assessment reported that the reserve was “mostly Uninterpretable with one area (that) can potentially be assessed” (Terratree Pty Ltd 2018).

Dieback Occurrence: Approximately 42 % Infested

Thomas Street Reserve is predominantly Infested (41.9 %) and Uninterpretable (6 %) or Excluded due to the Degraded vegetation condition (34.8 %). The Uninfested area within the reserve is almost all Unprotectable due to its size and fragmentation.

Dieback Occurrence Area Statement

Occurrence Category	Area (ha)	% of Assessment Area
Excluded	0.64	34.78
Infested	0.77	41.85
Uninfested	0.08	4.35
Uninfested Unprotectable	0.24	13.04
Uninterpretable	0.11	5.98
Total	1.84	100

Sample Results

Sample	Species	Easting	Northing	Result	Retest Result
SOM19S36	<i>Xanthorrhoea gracilis</i> & <i>Banksia sessilis</i>	415922	6469102	<i>P. cinnamomi</i>	N/A

Other Comments/Issues

Nil

Recommended Management Actions

1. Revegetate Infested and Excluded (Degraded) areas with resistant species or species that have a low susceptibility to *Phytophthora cinnamomi*.



Photo 1: Active Dieback in Thomas Street Reserve with a dead *Xanthorrhoea gracilis* that returned a positive result for *P. cinnamomi* (SoM19S36)



Photo 2: Uninterpretable area in Thomas Street Reserve that was Excluded from assessment due to the Degraded vegetation condition



Legend

- Assessment Area
- Road Network
- Contours

Sample Locations and Results

- ▲ Positive: *P. cinnamomi*

Dieback Occurrence

- Excluded
- Infested
- Uninfested
- Uninfested Unprotectable
- Uninterpretable



Project Location

Dieback Occurrence Map Thomas Street Reserve Shire of Mundaring Priority Reserves Dieback Assessment 2019



0 25 50 m

Datum: GDA 1994
Projection: MGA Zone 50
Scale: 1:1 250 at A3

Date: 24/11/2020	Prepared: A. Caubo	Project #: T19011
Expiry: 23/11/2021	Checked: H. Legge	
	Review: J. Grehan	
	Revision:	

Figure 33

Terratree

Appendix C: VHS Laboratory Sample Result Sheets

VEGETATION HEALTH SERVICE - PHYTOPHTHORA SAMPLE INFORMATION SHEET

SEND TO: VHS Lab, Forest and Ecosystem Management Div - DPaW, 17 Dick Perry Ave KENSINGTON 6151 **Phone:** (08) 9334 0317 **Fax:** (08) 9334 0114

CONTACT DETAILS of sender

Name J. Grehan _____
 Fax No. _____ Phone No. 0400 003 688 _____
 DPaW Office or Company Name Terratree Pty Ltd _____

GDA
 (1)
 GDA 94 X

Job Type (Please indicate)

DPaW (C) Alcoa (A)
 Recoup (R) FPC
 Private (P) Other _____

VHS USE ONLY

Date received 12.4.19
 Date faxed 26.4.19

NOTIFY
DFWA?

VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Give location, eg. Forest Block or Shire, etc. and sample number)	Plant species sampled	Site Impact (2)	Zone 50 or 51	Map Reference (3)	Land Tenure (4)	RESULT s/s root (5)	RESULT bait (5)
VHS 39318	9/4/2019	SoM19 Sample 01	<i>Xanthorrhoea preissii</i>	M	50	E 422 447 N 647 1466	R		CIN
VHS 39319	9/4/2019	SoM19 Sample 02	<i>Banksia grandis</i>	M	50	E 422 547 N 647 0794	R		NEG
VHS 39320	9/4/2019	SoM19 Sample 03	<i>Banksia grandis</i>	L	50	E 422 536 N 647 0623	R		NEG
VHS 39321	9/4/2019	SoM19 Sample 04	<i>Banksia grandis</i>	M	50	E 422 493 N 647 0875	R		NEG
						E - - - - - N - - - - -			
						E - - - - - N - - - - -			
						E - - - - - N - - - - -			
						E - - - - - N - - - - -			

NOTES:

- Please tick this box if your map references are supplied in the **GDA 94** standard. If not, please specify the datum used.
- Site impact - Low, Moderate, or High (as in the Dieback Interpreter's Manual).
- An MGA map reference with prefixes **must** be supplied for all samples.
- Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
- Result codes used - CIN = *Phytophthora cinnamomi*, MUL = *P. multivora*, CRY = *P. cryptogea*, PI = *P. inundata*, ARE = *P. arenaria*, ELO = *P. elongata*, THE = *P. thermophila*, PM = *P. megasperma*, PN = *P. nicotianae*, CON = *P. constricta*, ALT = *P. alticola*, NEG = negative, SUB = subcultured for further tests

Please Note: a). NEG results cannot be used to represent a total absence of *Phytophthora* in the sampled area. b). Information from your samples will be incorporated into the VHS database.

COMMENTS: SoM19 = Shire of Mundaring 2019

SEND TO: VHS Lab, Forest and Ecosystem Management Div - DPaW, 17 Dick Perry Ave KENSINGTON 6151 **Phone:** (08) 9334 0317 **Fax:** (08) 9334 0114

CONTACT DETAILS of sender

Name: Tmaara Kabat

Fax No. _____ Phone No.: 0892501163

DPaW Office or Company Name: Terratree Pty Ltd

GDA

(1)

GDA 94

—✓—

Job Type (Please indicate)

DPaW (C) Alcoa (A)

Recoup (R) FPC

Private (P) Other _____

VHS USE ONLY

Date received 29.4.19

Date faxed 14.5.19

**NOTIFY
DFWA?**

VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Give location, eg. Forest Block or Shire, etc. and sample number)	Plant species sampled	Site Impact (2)	Zone 50 or 51	Map Reference (3)	Land Tenure (4)	RESULT s/s root (5)	RESULT bait (5)
VHS 39348 	24/4/19	Shire of Mundaring 2019 sample 5 SOM19S05	<i>Banksia squarrosa</i>	L	50	E 434543 N 6481028	P		CIN
VHS 39349 	24/4/19	SOM19S06	<i>Banksia squarrosa</i>	L	50	E 434128 N 6481447	P		NEG
VHS 39350 	24/4/19	SOM19S07	<i>Banksia sessilis</i>	L	50	E 434411 N 6481280	P		NEG
VHS 39351 	24/4/19	SOM19S08	<i>Banksia squarrosa</i>	L	50	E 434304 N 6481358	P		NEG
VHS 39352 	24/4/19	SOM19S09	<i>Xanthorrea preissii</i>	L	50	E 435605 N 6474218	P		CIN
VHS 39353 	24/4/19	SOM19S10	<i>Banksia squarrosa</i>	L	50	E 435628 N 6473746	P		NEG
						E - - - - - N - - - - -			
						E - - - - - N - - - - -			

NOTES:

- Please tick this box if your map references are supplied in the **GDA 94** standard. If not, please specify the datum used.
- Site impact - Low, Moderate, or High (as in the Dieback Interpreter's Manual).
- An MGA map reference with prefixes **must** be supplied for all samples.
- Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
- Result codes used - CIN = *Phytophthora cinnamomi*, MUL = *P. multivora*, CRY = *P. cryptogea*, PI = *P. inundata*, ARE = *P. arenaria*, ELO = *P. elongata*, THE = *P. thermophila*, PM = *P. megasperma*, PN = *P. nicotianae*, CON = *P. constricta*, ALT = *P. alticola*, NEG = negative, SUB = subcultured for further tests

Please Note: a). NEG results cannot be used to represent a total absence of *Phytophthora* in the sampled area. b). Information from your samples will be incorporated into the VHS database.

COMMENTS:

VEGETATION HEALTH SERVICE - PHYTOPHTHORA SAMPLE INFORMATION SHEET

SEND TO: VHS Lab, Forest and Ecosystem Management Div - DPaW, 17 Dick Perry Ave KENSINGTON 6151 Phone: (08) 9334 0317 Fax: (08) 9334 0114

CONTACT DETAILS of sender

Name: Glenn Maslen _____

Fax No. _____ Phone No.: 0408406410

DPaW Office or Company Name: Terratree Pty Ltd

GDA

(I)

GDA 94

Job Type (Please indicate)

DPaW (C) Alcoa (A)

Recoup (R) FPC

Private (P) Other _____

VHS USE ONLY

Date received 6.5.19

Date faxed 14.5.19 20.5

~~NOTIFY DFWA?~~

29.5.19

6.6.19

VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Give location, eg. Forest Block or Shire, etc. and sample number)	Plant species sampled	Site Impact (2)	Zone 50 or 51	Map Reference (3)	Land Tenure (4)	RESULT s/s root (5)	RESULT bait (5)
VHS 39387	30/4/19	Shire of Mundaring SoM19S11	<i>Xanthorrhoea preissii</i>	L	50	E 427341 N 6478186	R		NEG
VHS 39388	30/4/19	SoM19S12	<i>Xanthorrhoea preissii</i>	M	50	E 427012 N 6478446	R		CIN
VHS 39389	1/5/19	SoM19S13	<i>Banksia grandis</i>	H	50	E 425873 N 6478306	R		NEG
VHS 39390	1/5/19	SoM19S14	<i>Banksia grandis</i>	H	50	E 425890 N 6477920	R		NEG
VHS 39391	1/5/19	SoM19S15	<i>Xanthorrhoea preissii</i>	M	50	E 426487 N 6478128	R		NEG
VHS 39392	1/5/19	SoM19S16	<i>Banksia grandis</i> and <i>Patersonia occidentalis</i>	L	50	E 422739 N 6477130	R		CIN
VHS 39393	2/5/19	SoM19S17	<i>Xanthorrhoea preissii</i>	L	50	E 428833 N 6476999	R		CIN
VHS 39394	2/5/19	SoM19S18	<i>Xanthorrhoea gracilis</i>	M	50	E 427117 N 6473363	R		CIN

NOTES:

1. Please tick this box if your map references are supplied in the GDA 94 standard. If not, please specify the datum used.
2. Site impact - Low, Moderate, or High (as in the Dieback Interpreter's Manual).
3. An MGA map reference with prefixes **must** be supplied for all samples.
4. Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
5. Result codes used - CIN = *Phytophthora cinnamomi*, MUL = *P. multivora*, CRY = *P. cryptogea*, PI = *P. inundata*, ARE = *P. arenaria*, ELO = *P. elongata*, THE = *P. thermophila*, PM = *P. megasperma*, PN = *P. nicotianae*, CON = *P. constricta*, ALT = *P. alticola*, NEG = negative, SUB = subcultured for further tests

Please Note: a). NEG results cannot be used to represent a total absence of *Phytophthora* in the sampled area. b). Information from your samples will be incorporated into the VHS database.

COMMENTS:

VEGETATION HEALTH SERVICE - PHYTOPHTHORA SAMPLE INFORMATION SHEET

SEND TO: VHS Lab, Forest and Ecosystem Management Div - DPaW, 17 Dick Perry Ave KENSINGTON 6151 Phone: (08) 9334 0317 Fax: (08) 9334 0114

CONTACT DETAILS of sender

Name: Glenn Maslen _____

Fax No. _____ Phone No.: 0408406410

DPaW Office or Company Name: Terratree Pty Ltd

GDA

(1)

GDA 94

✓

Job Type (Please indicate)

DPaW (C) Alcoa (A)

Recoup (R) FPC

Private (P) Other _____

VHS USE ONLY

Date received 6.5.19

Date faxed 14.5.19, 20.5.19

NOTIFY DFWA?

29.5.19

VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Give location, eg. Forest Block or Shire, etc. and sample number)	Plant species sampled	Site Impact (2)	Zone 50 or 51	Map Reference (3)	Land Tenure (4)	RESULT s/s root (5)	RESULT bait (5)
VHS 39395	3/5/19	Shire of Mundaring SoM19S19	<i>Xanthorrhoea preissii</i>	M	50	E 430122 N 6475400	R		NEG
VHS 39396	3/5/19	SoM19S20	<i>Banksia squarrosa</i>	M	50	E 430919 N 6474169	R		CIN
VHS 39397	3/5/19	SoM19S21	<i>Banksia squarrosa</i>	L	50	E 432880 N 6474273	R		NEG
VHS 39398	3/5/19	SoM19S22	<i>Banksia sessilis</i>	M	50	E 431986 N 6474107	R		CIN

RETEST

CIN

NOTES:

1. Please tick this box if your map references are supplied in the **GDA 94** standard. If not, please specify the datum used.
2. Site impact - Low, Moderate, or High (as in the Dieback Interpreter's Manual).
3. An MGA map reference with prefixes **must** be supplied for all samples.
4. Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
5. Result codes used - CIN = *Phytophthora cinnamomi*, MUL = *P. multivora*, CRY = *P. cryptogea*, PI = *P. inundata*, ARE = *P. arenaria*, ELO = *P. elongata*, THE = *P. thermophila*, PM = *P. megasperma*, PN = *P. nicotianae*, CON = *P. constricta*, ALT = *P. alticola*, NEG = negative, SUB = subcultured for further tests

Please Note: a). NEG results cannot be used to represent a total absence of *Phytophthora* in the sampled area. b). Information from your samples will be incorporated into the VHS database.

COMMENTS:

GlennVEGETATION HEALTH SERVICE - PHYTOPHTHORA SAMPLE INFORMATION SHEET

SEND TO: VHS Lab, Forest and Ecosystem Management Div - DPaW, 17 Dick Perry Ave KENSINGTON 6151 Phone:(08) 9334 0317 Fax: (08) 9334 0114

CONTACT DETAILS of sender

Name: Glenn Maslen _____
 Fax No. _____ Phone No.: 0892501163
 DPaW Office or Company Name: Terratree Pty Ltd

GDA

(1)

GDA 94

✓

Job Type (Please indicate)

DPaW (C) Alcoa (A)
 Recoup (R) FPC
 Private (P) Other _____

VHS USE ONLY

Date received 14.5.19

Date faxed 25.7.19, 10.6.19

NOTIFY DFWA?

VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Give location, eg. Forest Block or Shire, etc. and sample number)	Plant species sampled	Site Impact (2)	Zone 50 or 51	Map Reference (3)	Land Tenure (4)	RESULT s/s root (5)	RESULT bait (5)
VHS 39479	8/5/19	Shire of Mundaring SoM19S23	<i>Xanthorrhoea gracilis</i>	L	50	E 422293 N 6473349	R		CIN
VHS 39480	8/5/19	SoM19S24	<i>Xanthorrhoea gracilis</i>	H	50	E 417639 N 6477124	R		CIN
VHS 39481	8/5/19	SoM19S25	<i>Xanthorrhoea preissii</i>	L	50	E 418140 N 6472294	R		NEG
VHS 39482	8/5/19	SoM19S26	<i>Xanthorrhoea gracilis</i>	L	50	E 418182 N 6472379	R		CIN
VHS 39483	10/5/19	SoM19S27	<i>Xanthorrhoea gracilis</i>	L	50	E 415493 N 6471632	R		CIN
VHS 39484	10/5/19	SoM19S28	<i>Xanthorrhoea preissii</i>	M	50	E 417094 N 6472869	R		NEG
VHS 39485	13/5/19	SoM19S29	<i>Banksia grandis</i>	M	50	E 417386 N 6469336	R		NEG
VHS 39486	13/5/19	SoM19S30	<i>Banksia grandis</i>	L	50	E 417064 N 6469869	R		CIN

RETEST

* CIN

* NEG

* NEG

NOTES:

- Please tick this box if your map references are supplied in the GDA 94 standard. If not, please specify the datum used.
- Site impact - Low, Moderate, or High (as in the Dieback Interpreter's Manual).
- An MGA map reference with prefixes must be supplied for all samples.
- Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
- Result codes used - CIN = *Phytophthora cinnamomi*, MUL = *P. multivora*, CRY = *P. cryptogea*, PI = *P. inundata*, ARE = *P. arenaria*, ELO = *P. elongata*, THE = *P. thermophila*, PM = *P. megasperma*, PN = *P. nicotianae*, CON = *P. constricta*, ALT = *P. alticola*, NEG = negative, SUB = subcultured for further tests

Please Note: a). NEG results cannot be used to represent a total absence of *Phytophthora* in the sampled area. b). Information from your samples will be incorporated into the VHS database.

COMMENTS:

Glenn VEGETATION HEALTH SERVICE - PHYTOPHTHORA SAMPLING INFORMATION SHEET

SEND TO: VHS Lab, Forest and Ecosystem Management Div - DPaW, 17 Dick Perry Ave KENSINGTON 6151 **Phone:** (08) 9334 0317 **Fax:** (08) 9334 0114

CONTACT DETAILS of sender

Name: Glenn Maslen _____
 Fax No. _____ Phone No.: 0892501163
 DPaW Office or Company Name: Terratree Pty Ltd

GDA (1) GDA 94 —✓—

Job Type (Please indicate)	
DPaW (C)	Alcoa (A)
Recoup (R)	FPC
Private (P)	Other _____

VHS USE ONLY
Date received 14.5.19
Date faxed 27.5.19, 10.6.19

NOTIFY DFWA?

VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Give location, eg. Forest Block or Shire, etc. and sample number)	Plant species sampled	Site Impact (2)	Zone 50 or 51	Map Reference (3)	Land Tenure (4)	RESULT s/s root (5)	RESULT bait (5)
VHS 39487 	13/5/19	Shire of Mundaring SoM19S31	<i>Banksia grandis</i>	M	50	E 417819 N 6469414	R		NEG*
VHS 39488 	14/5/19	SoM19S32	<i>Banksia sessilis</i>	M	50	E 417238 N 6473049	R		CIN

RETEST
NEG

NOTES:

- Please tick this box if your map references are supplied in the **GDA 94** standard. If not, please specify the datum used.
- Site impact - Low, Moderate, or High (as in the Dieback Interpreter's Manual).
- An MGA map reference with prefixes **must** be supplied for all samples.
- Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
- Result codes used - CIN = *Phytophthora cinnamomi*, MUL = *P. multivora*, CRY = *P. cryptogea*, PI = *P. inundata*, ARE = *P. arenaria*, ELO = *P. elongata*, THE = *P. thermophila*, PM = *P. megasperma*, PN = *P. nicotianae*, CON = *P. constricta*, ALT = *P. alticola*, NEG = negative, SUB = subcultured for further tests

Please Note: a). NEG results cannot be used to represent a total absence of *Phytophthora* in the sampled area. b). Information from your samples will be incorporated into the VHS database.

COMMENTS:

VEGETATION HEALTH SERVICE - PHYTOPHTHORA SAMPLE INFORMATION SHEET

SEND TO: VHS Lab, Forest and Ecosystem Management Div - DPaW, 17 Dick Perry Ave KENSINGTON 6151 Phone: (08) 9334 0317 Fax: (08) 9334 0114

CONTACT DETAILS of sender

Name: Glenn Maslen

Fax No. Phone No.: 0892501163

DPaW Office or Company Name: Terratree Pty Ltd

GDA

(1)

GDA 94

Job Type (Please indicate)

DPaW (C) Alcoa (A)

Recoup (R) FPC

Private (P) Other

VHS USE ONLY

Date received 23.5.19

Date faxed 29.5.19 7.6.19

NOTIFY

DEWA?

VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Give location, eg. Forest Block or Shire, etc. and sample number)	Plant species sampled	Site Impact (2)	Zone 50 or 51	Map Reference (3)	Land Tenure (4)	RESULT s/s root (5)	RESULT bait (5)
---------------------------------------------	-------------	------------------------------------------------------------------------------------	-----------------------	--------------------	------------------	----------------------	--------------------	---------------------------	-----------------------

VHS 39508	21/5/19	SoM19S33 Shire of Mundaring	<i>Banksia grandis</i>	M	50	E 424008 N 6472302	R		NEG
VHS 39509	21/5/19	SoM19S34	<i>Xanthorrhoea gracilis</i>	M	50	E 418291 N 6470233	R		CIN
VHS 39510	21/5/19	SoM19S35	<i>Xanthorrhoea gracilis</i>	M	50	E 418805 N 6469989	R		CIN
VHS 39511	21/5/19	SoM19S36	<i>Xanthorrhoea gracilis</i> and <i>Banksia sessilis</i>	M	50	E 415922 N 6469102	R		CIN

NOTES:

- Please tick this box if your map references are supplied in the GDA 94 standard. If not, please specify the datum used.
- Site impact - Low, Moderate, or High (as in the Dieback Interpreter's Manual).
- An MGA map reference with prefixes **must** be supplied for all samples.
- Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
- Result codes used - CIN = *Phytophthora cinnamomi*, MUL = *P. multivora*, CRY = *P. cryptogea*, PI = *P. inundata*, ARE = *P. arenaria*, ELO = *P. elongata*, THE = *P. thermophila*, PM = *P. megasperma*, PN = *P. nicotianae*, CON = *P. constricta*, ALT = *P. alticola*, NEG = negative, SUB = subcultured for further tests

Please Note: a). NEG results cannot be used to represent a total absence of *Phytophthora* in the sampled area. b). Information from your samples will be incorporated into the VHS database.

COMMENTS:

VEGETATION HEALTH SERVICE - PHYTOPHTHORA SAMPLE INFORMATION SHEET

SEND TO: VHS Lab, Forest and Ecosystem Management Div - DPaW, 17 Dick Perry Ave KENSINGTON 6151 Phone: (08) 9334 0317 Fax: (08) 9334 0114

CONTACT DETAILS of sender

Name Glenn Maslen _____

Fax No. _____ Phone No. 0408406410 _____

DPaW Office or Company Name Terratree Pty Ltd _____

GDA

(1)

GDA 94

✓

Job Type (Please indicate)

DPaW (C) Alcoa (A)

Recoup (R) FPC

Private (P) Other _____

VHS USE ONLY

Date received 13-6-19

Date faxed 21-6-19, 27/6/19

NOTIFY DFWA?

VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Give location, eg. Forest Block or Shire, etc. and sample number)	Plant species sampled	Site Impact (2)	Zone 50 or 51	Map Reference (3)	Land Tenure (4)	RESULT s/s root (5)	RESULT bait (5)
VHS 39601	11/06/19	SoM19S37	<i>Xanthorrhoea preissii</i>	M	50	E 425331 N 6470714	R		CIN
VHS 39602	12/06	SoM19S38	<i>Xanthorrhoea gracilis</i>	L	50	E 422738 N 6470062	R		CIN
VHS 39603	12/06	SoM19S39	<i>Xanthorrhoea gracilis</i>	L	50	E 422112 N 6469592	R		CIN
VHS 39604	12/06	SoM19S40	<i>Xanthorrhoea preissii</i>	M	50	E 416205 N 6469096	R		CIN
VHS 39605	12/06	SoM19S41	<i>Xanthorrhoea gracilis</i>	M	50	E 410314 N 6469208	R		CIN
VHS 39606	12/06	SoM19S49	<i>Banksia squarrosa</i>	L	50	E 424238 N 6481389	R		NEG
VHS 39607	12/06	SoM19S50	<i>Banksia squarrosa</i>	L	50	E 434205 N 6481536	R		NEG
						E - - - - - N - - - - -			

NOTES:

- Please tick this box if your map references are supplied in the GDA 94 standard. If not, please specify the datum used.
- Site impact - Low, Moderate, or High (as in the Dieback Interpreter's Manual).
- An MGA map reference with prefixes must be supplied for all samples.
- Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
- Result codes used - CIN = *Phytophthora cinnamomi*, MUL = *P. multivora*, CRY = *P. cryptogea*, PI = *P. inundata*, ARE = *P. arenaria*, ELO = *P. elongata*, THE = *P. thermophila*, PM = *P. megasperma*, PN = *P. nicotianae*, CON = *P. constricta*, ALT = *P. alticola*, NEG = negative, SUB = subcultured for further tests

Please Note: a). NEG results cannot be used to represent a total absence of *Phytophthora* in the sampled area. b). Information from your samples will be incorporated into the VHS database.

COMMENTS:

VEGETATION HEALTH SERVICE - PHYTOPHTHORA SAMPLE INFORMATION SHEET

SEND TO: VHS Lab, Forest and Ecosystem Management Div - DPaW, 17 Dick Perry Ave KENSINGTON 6151 Phone: (08) 9334 0317 Fax: (08) 9334 0114

CONTACT DETAILS of sender

Name: Glenn Maslen
 Fax No. _____ Phone No. 0408406410
 DPaW Office or Company Name Terratree Pty Ltd

GDA
 (1)
 GDA 94 ✓

Job Type (Please indicate)

DPaW (C) Alcoa (A)
 Recoup (R) FPC
 Private (P) Other _____

VHS USE ONLY

Date received 17.6.19
 Date faxed 24.6.19, 1-7-19

NOTIFY
 DFWA?

VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Give location, eg. Forest Block or Shire, etc. and sample number)	Plant species sampled	Site Impact (2)	Zone 50 or 51	Map Reference (3)	Land Tenure (4)	RESULT s/s root (5)	RESULT bait (5)
VHS 39628 	13/6/19	SoM19S42	<i>Xanthorrhoea preissii</i>	M	50	E 426844 N 6477921	R		NEG
VHS 39629 	13/6/19	SoM19S43	<i>Xanthorrhoea gracilis</i>	M	50	E 426135 N 6477917	R		NEG
VHS 39630 	14/6/19	SoM19S44	<i>Banksia grandis</i>	L	50	E 428771 N 6472619	R		CIN
VHS 39631 	14/6/19	SoM19S45	<i>Banksia sessilis</i>	M	50	E 429551 N 6473068	R		NEG
						E ----- N -----			
						E ----- N -----			
						E ----- N -----			
						E ----- N -----			

NOTES:

- Please tick this box if your map references are supplied in the GDA 94 standard. If not, please specify the datum used.
- Site impact - Low, Moderate, or High (as in the Dieback Interpreter's Manual).
- An MGA map reference with prefixes **must** be supplied for all samples.
- Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
- Result codes used - CIN = *Phytophthora cinnamomi*, MUL = *P. multivora*, CRY = *P. cryptogea*, PI = *P. inundata*, ARE = *P. arenaria*, ELO = *P. elongata*, THE = *P. thermophila*, PM = *P. megasperma*, PN = *P. nicotianae*, CON = *P. constricta*, ALT = *P. alticola*, NEG = negative, SUB = subcultured for further tests

Please Note: a). NEG results cannot be used to represent a total absence of *Phytophthora* in the sampled area. b). Information from your samples will be incorporated into the VHS database.

COMMENTS:

VEGETATION HEALTH SERVICE - PHYTOPHTHORA SAMPLE INFORMATION SHEET

SEND TO: VHS Lab, Forest and Ecosystem Management Div - DPaW, 17 Dick Perry Ave KENSINGTON 6151 Phone: (08) 9334 0317 Fax: (08) 9334 0114

CONTACT DETAILS of sender

Name Glenn Maslen
Fax No. Phone No. 0408406410
DPaW Office or Company Name Terratree Pty Ltd

GDA

(1)

GDA 94 ✓

Job Type (Please indicate)

DPaW (C) Alcoa (A)
Recoup (R) FPC
Private (P) Other

VHS USE ONLY

Date received 28.6.19

Date faxed 4.7.19, 11.7.19, 12.7.19, 24.7.19

NOTIFY DFWA?

VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Give location, eg. Forest Block or Shire, etc. and sample number)	Plant species sampled	Site Impact (2)	Zone 50 or 51	Map Reference (3)	Land Tenure (4)	RESULT s/s root (5)	RESULT bait (5)
VHS 39668	25/6/19	SoM19S46 Shire of Mundaring	<i>Xanthorrhoea preissii</i>	M	50	E 424005 N 6472498	R		NEG
VHS 39669	25/6/19	SoM19S47	<i>Xanthorrhoea preissii</i>	M	50	E 421762 N 6472761	R		NEG
VHS 39670	25/6/19	SoM19S48	<i>Xanthorrhoea preissii</i>	M	50	E 419251 N 6472435	R		NEG
VHS 39671	25/6/19	SoM19S51	<i>Xanthorrhoea gracilis</i>	M	50	E 417257 N 6472439	R		CIN
VHS 39672	25/6/19	SoM19S52	<i>B. sessilis</i> & <i>X. gracilis</i>	H	50	E 417749 N 6469579	R		CIN
VHS 39673	25/6/19	SoM19S53	<i>Xanthorrhoea preissii</i>	M	50	E 417225 N 6469133	R		NEG
VHS 39674	25/6/19	SoM19S54	<i>Xanthorrhoea preissii</i>	M	50	E 412633 N 6469908	R		NEG
VHS 39675	25/6/19	SoM19S55	<i>Xanthorrhoea preissii</i>	L	50	E 412663 N 6469578	R		NEG

RETEST

* CIN

* NEG

* CIN

* CIN

* NEG

NOTES:

- Please tick this box if your map references are supplied in the GDA 94 standard. If not, please specify the datum used.
- Site impact - Low, Moderate, or High (as in the Dieback Interpreter's Manual).
- An MGA map reference with prefixes **must** be supplied for all samples.
- Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
- Result codes used - CIN = *Phytophthora cinnamomi*, MUL = *P. multivora*, CRY = *P. cryptogea*, PI = *P. inundata*, ARE = *P. arenaria*, ELO = *P. elongata*, THE = *P. thermophila*, PM = *P. megasperma*, PN = *P. nicotianae*, CON = *P. constricta*, ALT = *P. alticola*, NEG = negative, SUB = subcultured for further tests

Please Note: a). NEG results cannot be used to represent a total absence of *Phytophthora* in the sampled area. b). Information from your samples will be incorporated into the VHS database.

COMMENTS:

VEGETATION HEALTH SERVICE - PHYTOPHTHORA SAMPLE INFORMATION SHEET

SEND TO: VHS Lab, Forest and Ecosystem Management Div - DPaW, 17 Dick Perry Ave KENSINGTON 6151 Phone: (08) 9334 0317 Fax: (08) 9334 0114

CONTACT DETAILS of sender

Name: Joe Grehan
Phone No. 9250 116 ; M: 0400 003 688; E: joeg@terratree.com.au
DPaW Office or Company Name: Terratree Pty Ltd

GDA

(1)

GDA 94 X

Job Type (Please indicate)

DPaW (C) Alcoa (A)
Recoup (R) FPC
Private (P) Other

VHS USE ONLY

Date received 5-7-19

Date faxed 10-7-19 8.8.19

NOTIFY DFWA?

VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Give location, eg. Forest Block or Shire, etc. and sample number)	Plant species sampled	Site Impact (2)	Zone 50 or 51	Map Reference (3)	Land Tenure (4)	RESULT s/s root (5)	RESULT bait (5)
VHS 39691	1-7-19	SoM19S56	<i>Banksia sessilis</i> & <i>Xanthorrhoea gracilis</i>	M	50	E 425 107 N 647 1858	R		CIN
VHS 39692	1-7-19	SoM19S57	<i>Banksia sessilis</i> & <i>Xanthorrhoea gracilis</i>	M	50	E 425 239 N 647 2182	R		CIN
VHS 39693	1-7-19	SoM19S58	<i>Banksia grandis</i>	M	50	E 425 502 N 647 1626	R		MUL*
						E - - - - - N - - - - -			
						E - - - - - N - - - - -			
						E - - - - - N - - - - -			
						E - - - - - N - - - - -			
						E - - - - - N - - - - -			

NOTES:

- Please tick this box if your map references are supplied in the GDA 94 standard. If not, please specify the datum used.
- Site impact - Low, Moderate, or High (as in the Dieback Interpreter's Manual).
- An MGA map reference with prefixes must be supplied for all samples.
- Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
- Result codes used - CIN = *Phytophthora cinnamomi*, MUL = *P. multivora*, CRY = *P. cryptogea*, PI = *P. inundata*, ARE = *P. arenaria*, ELO = *P. elongata*, THE = *P. thermophila*, PM = *P. megasperma*, PN = *P. nicotianae*, CON = *P. constricta*, ALT = *P. alticola*, NEG = negative, SUB = subcultured for further tests

Please Note: a). NEG results cannot be used to represent a total absence of *Phytophthora* in the sampled area. b). Information from your samples will be incorporated into the VHS database.

COMMENTS: SoM19= Shire of Mundaring 2019

* ID by CASM using DNA techniques

Entire sample used.



VEGETATION HEALTH SERVICE - PHYTOPHTHORA SAMPLE INFORMATION SHEET

USE ALL SAMPLE

SEND TO: VHS Lab, Forest and Ecosystem Management Div - DPaW, 17 Dick Perry Ave KENSINGTON 6151 Phone: (08) 9334 0317 Fax: (08) 9334 0114

CONTACT DETAILS of sender

Name: Glenn Maslen

Fax No. Phone No.: 0892501163

DPaW Office or Company Name: Terratree Pty Ltd

GDA

(1)

GDA 94

Job Type (Please indicate)

DPaW (C) Alcoa (A)

Recoup (R) FPC

Private (P) Other

VHS USE ONLY

Date received 16.7.19

Date faxed 22.7.19, 29.7.19

NOTIFY
DFWA?

VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Give location, eg. Forest Block or Shire, etc. and sample number)	Plant species sampled	Site Impact (2)	Zone 50 or 51	Map Reference (3)	Land Tenure (4)	RESULT s/s root (5)	RESULT bait (5)
VHS 39747	11/7/19	Shire of Mundaring SoM19S59	<i>B. grandis</i> & <i>X. gracilis</i>	M	50	E 425473 N 6471413	R		CIN
VHS 39748	11/7/19	SoM19S60	<i>Xanthorrhoea preissii</i>	M	50	E 410349 N 6470656	R		CIN
VHS 39749	11/7/19	SoM19S61	<i>Xanthorrhoea gracilis</i>	L	50	E 409505 N 6468841	R		CIN
VHS 39750	12/7/19	SoM19S62	<i>Xanthorrhoea gracilis</i>	L	50	E 413400 N 6468579	R		CIN
VHS 39751	12/7/19	SoM19S63	<i>Xanthorrhoea gracilis</i>	L	50	E 413393 N 6468368	R		CIN
VHS 39752	15/7/19	SoM19S64	<i>Xanthorrhoea gracilis</i>	L	50	E 418103 N 6471214	R		CIN
VHS 39753	15/7/19	SoM19S65	<i>Xanthorrhoea gracilis</i>	L	50	E 417010 N 6471683	R		CIN
VHS 39754	15/7/19	SoM19S66	<i>Xanthorrhoea gracilis</i>	M	50	E 417123 N 6471409	R		CIN

NOTES:

1. Please tick this box if your map references are supplied in the GDA 94 standard. If not, please specify the datum used.
2. Site impact - Low, Moderate, or High (as in the Dieback Interpreter's Manual).
3. An MGA map reference with prefixes **must** be supplied for all samples.
4. Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
5. Result codes used - CIN = *Phytophthora cinnamomi*, MUL = *P. multivora*, CRY = *P. cryptogea*, PI = *P. inundata*, ARE = *P. arenaria*, ELO = *P. elongata*, THE = *P. thermophila*, PM = *P. megasperma*, PN = *P. nicotianae*, CON = *P. constricta*, ALT = *P. alticola*, NEG = negative, SUB = subcultured for further tests

Please Note: a). NEG results cannot be used to represent a total absence of *Phytophthora* in the sampled area. b). Information from your samples will be incorporated into the VHS database.

COMMENTS:

VEGETATION HEALTH SERVICE - PHYTOPHTHORA SAMPLE INFORMATION SHEET

SEND TO: VHS Lab, Forest and Ecosystem Management Div - DPaW, 17 Dick Perry Ave KENSINGTON 6151 Phone: (08) 9334 0317 Fax: (08) 9334 0114

CONTACT DETAILS of sender

Name Glenn Maslen _____
 Fax No. _____ Phone No. 0408406410 _____
 DPaW Office or Company Name Terratree Pty Ltd _____

GDA

(1)

GDA 94

Job Type (Please indicate)

DPaW (C) Alcoa (A)
 Recoup (R) FPC
 Private (P) Other _____

VHS USE ONLY

Date received 6.8.19
 Date faxed 12.8.19 19.8.19

NOTIFY DFWA?

VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Give location, eg. Forest Block or Shire, etc. and sample number)	Plant species sampled	Site Impact (2)	Zone 50 or 51	Map Reference (3)	Land Tenure (4)	RESULT s/s root (5)	RESULT bait (5)
VHS 39799	30/07/19	SoM19S67	<i>Xanthorrhoea preissii</i>	L	50	E 413770 N 6468583	R		CIN
VHS 39800	30/07/19	SoM19S68	<i>Xanthorrhoea gracilis</i>	L	50	E 413842 N 6468387	R		NEG
VHS 39801	02/08/19	SoM19S69	<i>Xanthorrhoea gracilis</i>	L	50	E 414400 N 6468068	R		CIN
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NOTES:

- Please tick this box if your map references are supplied in the GDA 94 standard. If not, please specify the datum used.
- Site impact - Low, Moderate, or High (as in the Dieback Interpreter's Manual).
- An MGA map reference with prefixes **must** be supplied for all samples.
- Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
- Result codes used - CIN = *Phytophthora cinnamomi*, MUL = *P. multivora*, CRY = *P. cryptogea*, PI = *P. inundata*, ARE = *P. arenaria*, ELO = *P. elongata*, THE = *P. thermophila*, = *P. megasperma*, PN = *P. nicotianae*, CON = *P. constricta*, ALT = *P. alticola*, NEG = negative, SUB = subcultured for further tests

Please Note: a). NEG results cannot be used to represent a total absence of *Phytophthora* in the sampled area. b). Information from your samples will be incorporated into the VHS database.

COMMENTS: