

APPENDIX H

ENVIRONMENTAL REPORT- DIE BACK PROTOCOLS

Shire of Serpentine-Jarrahdale

Kiernan Park Dieback Assessment

Phytophthora Dieback occurrence assessment – Version 2.0



| | |
|--------------------|--|
| <i>Client</i> | <i>Shire of Serpentine-Jarrahdale</i> |
| <i>Report name</i> | <i>Kiernan Park Dieback Assessment</i> |

This report has been prepared in accordance with the scope of work agreed between Shire of Serpentine-Jarrahdale and Glevan Consulting and contains results and recommendations specific to the agreement. Results and recommendations in this report should not be referenced for other projects without the written consent of Glevan Consulting.

Procedures and guidelines stipulated in various manuals, particularly Phytophthora Dieback Interpreters Manual for lands managed by the Department (DBCA), are applied as the base methodology used by Glevan Consulting in the delivery of the services and products required by this scope of work. These guidelines, along with overarching peer review and quality standards ensure that all results are presented to the highest standard.

Glevan Consulting has assessed areas based on existing evidence presented at the time of assessment. The Phytophthora pathogen may exist in the soil as incipient disease. Methods have been devised and utilised that compensate for this phenomenon; however, very new centres of infestation, that do not present any visible evidence, may remain undetected during the assessment.

Executive Summary

Glevan Consulting conducted an assessment of the vegetation associated with proposed Kiernan Park Recreation Precinct for the presence of Phytophthora Dieback. The Study Area is located in Whitby, within the Shire of Serpentine-Jarrahdale and covers 64.05 hectares.

The assessment was conducted on the 30-06-2022 by Simon Robinson and Danica Delaporte. No records or evidence of previous Phytophthora Dieback assessments for the study area were observed.

The majority (58.45 ha) of the study area was excluded from assessment due to being either degraded or devoid of vegetation (Figure 2). A single Phytophthora dieback infestation, comprising 1.15 ha was identified and mapped during the assessment. An additional 4.45 ha of the study area was observed to be uninfested.

Two soil and tissue samples were taken during the assessment, one of which produced a positive result.

The assessment is valid for 12 months and will expire in June 2023.

Table of Contents

| | | |
|-----|--|----|
| 1 | <i>Introduction</i> | 1 |
| 1.1 | Location of Project Area. | 1 |
| 2 | <i>Background</i> | 3 |
| 3 | <i>Materials and methods</i> | 4 |
| 3.1 | The assessment area | 4 |
| 3.2 | The assessment method | 5 |
| 3.3 | Collection of evidence of Phytophthora Dieback | 6 |
| 3.4 | Sampling | 7 |
| 3.5 | Determining Protectable areas | 7 |
| 4 | <i>Results</i> | 9 |
| 4.1 | Disease distribution | 9 |
| 4.2 | Other <i>Phytophthora</i> species | 9 |
| 4.3 | Ecosystem health | 9 |
| 4.4 | <i>Armillaria luteobubalina</i> | 9 |
| 4.5 | Allocation of categories | 9 |
| 4.6 | Protectable and unprotectable areas | 10 |
| 4.7 | Sample results | 10 |
| 5 | <i>Discussion</i> | 12 |
| 6 | <i>Bibliography</i> | 15 |
| 7 | <i>Appendices</i> | 16 |
| 7.1 | Sample summary | 16 |
| 7.2 | Phytophthora Dieback Occurrence map | 17 |
| 7.3 | Mapping Metadata | 18 |
| 7.4 | Shapefile spatial data | 18 |

List of Figures

Figure 1 - Study area location.....2

Figure 2 - *Xanthorrhoea preissii* death on the disease front.....**Error! Bookmark not defined.**

Figure 3 – *Recent disease expression* **Error! Bookmark not defined.**

Figure 4 - Occurrence Map 19

List of Tables

Table 1 - Keighery Vegetation Condition Scale4

Table 2 - Phytophthora Dieback assessment for vegetation condition5

Table 3 - Assessment area statement9

Table 4 - Determination of requirement for sampling..... 10

1 Introduction

Glevan Consulting was commissioned by Natural Area Management Services on behalf of the Shire of Serpentine-Jarrahdale to conduct an assessment of the vegetation associated with proposed Kiernan Park Recreation Precinct for the presence of Phytophthora Dieback. This Phytophthora Dieback assessment is part of the baseline environmental surveys required prior to the commencement of disturbance activities.

1.1 Location of Project Area.

The study area is located on the corner of Kiernan Street and the South Western Highway, Whitby, in the Shire of Serpentine-Jarrahdale (Figure 1).



Figure 1 - Study area location

2 Background

Thousands of Australian native plant species are susceptible to Phytophthora dieback—a destructive disease caused by the pathogen *Phytophthora cinnamomi* and other Phytophthora species. This disease is a major threat to Australia’s biodiversity, placing important plant species at risk of death, local extirpation or even extinction. Its dramatic impact on plant communities can also result in major declines in some insect, bird and animal species due to the loss of shelter, nesting sites and food sources. Phytophthora dieback can cause permanent damage to ecosystems. Once an area is infested with the pathogen, eradication is usually impossible. Awareness that human activity can easily spread the pathogen will help prevent an increase in the extent of this disease. (Commonwealth of Australia, 2018)

Phytophthora is a microscopic water mould that belongs to the class Oomycetes. Oomycete organisms are filamentous and absorptive and reproduce both sexually and asexually. *Phytophthora*'s are considered parasitic. It behaves largely as a necrotrophic pathogen causing damage to the host plant’s root tissues because of infection and invasion. (Department of Parks and Wildlife, 2015) The pathogen infects a host when it enters at a cellular level and damages the cell structure.

Phytophthora Dieback is the result of interaction between three physical components forming a ‘disease triangle’: the pathogen (*Phytophthora species*), the environment and the host. All three components are needed for the disease to develop over time.

The relationship between the presence of *Phytophthora* and the development of Phytophthora Dieback disease is variable based on the susceptibility of native plant species and the different environmental characteristics, landform types and rainfall zones across bioregions.

3 Materials and methods

3.1 The assessment area

Areas within the project area will be excluded from assessment if the vegetation is suffering from significant disturbance. This disturbance (Table 1Error! Reference source not found.) is based on Vegetation Condition Scales (Keighery, 1994). The remaining area, including area outside of the project area if necessary, will be categorised post assessment into Phytophthora Dieback occurrence categories (Table 2).

Table 1 - Keighery Vegetation Condition Scale

| Scale | | Vegetation condition |
|-------|---------------------|---|
| 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. |
| 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. |
| 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 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. |

Table 2 - Phytophthora Dieback assessment for vegetation condition

| Vegetation Condition | Phytophthora occurrence category |
|---|---|
| Naturally vegetated areas. Keighery disturbance rating of 3 or less. Phytophthora occurrence categorisation is possible. | Infested - Determined to have plant disease symptoms consistent with the presence of <i>Phytophthora cinnamomi</i> . |
| Vegetation with rating of 4 may be interpretable – Interpreter discretion required | Uninfested - Determined to be free of plant disease symptoms that indicate the presence of <i>P. cinnamomi</i> |
| | Uninterpretable - Undisturbed areas where susceptible plants are absent, or too few to make a determination of the presence or absence of <i>P. cinnamomi</i> . |
| | Not yet resolved. |
| Vegetation structure temporarily altered. | Temporarily Uninterpretable - Areas of disturbance where natural vegetation is likely to recover. |
| Vegetation structure severely altered. Keighery disturbance rating 4 or greater. Phytophthora occurrence assessment is not possible | Excluded. |

3.2 The assessment method

All Phytophthora Dieback detection, diagnosis and mapping will be performed to standards and procedures defined in FEM047 Phytophthora Dieback Interpreter's Manual (DPaW, 2015) Chapter 6. These procedures are grounded on the presence in the vegetation of Indicator Species, and the observance of deaths in these plants. An indicator species is a plant species that is reliably susceptible to *Phytophthora cinnamomi*. Indicator species deaths (ISDs) alone do not necessarily indicate disease presence and it is necessary to consider all environmental and ecological factors that may be present. These other factors (as listed in FEM047) include:

- Chronology of deaths;
- Pattern of deaths;
- Topographical position;
- Vectoring – causal agencies, and;
- Biomass and biological diversity reduction.

Other causes of plant deaths need to be considered when determining the presence of Phytophthora Dieback, including (from FEM047):

- *Armillaria luteobubalina*;
- various cankers;
- insects;
- drought, wind scorch and frost;
- salinity and waterlogging;
- fire and lightning;
- senescence and competition;
- physical damage, and;
- herbicides and chemical spills.

The assessment type will be either a comprehensive assessment using transects (demarcating all obvious infested areas and then systematically assessing remaining areas using transects) or a linear assessment (when a proposed activity is linear in nature, such as along a utility easement or road) using standards defined by Chapter 8, FEM047.

Prior to assessment, all relevant information relevant to the project will be assembled to assist the interpretation process (as defined in Chapter 7, FEM047). This information may include previous assessments of the area, history of burning and possible other disturbances.

3.3 Collection of evidence of Phytophthora Dieback

During the assessment process, the collection of evidence to support the field diagnosis is recorded using a tablet running the ESRI Collector application. Waypoints are recorded at locations to show evidence of:

- where field diagnosis is certain or almost certain of Phytophthora Dieback infestation;
- healthy indicator species where field diagnosis is almost certain of the site being uninfested;
- sites with too few or devoid of indicator species, thus supporting uninterpretable classification, or
- areas of disturbance, which are temporarily uninterpretable or excluded from assessment.

Additional waypoints recorded include:

- Points located at soil and tissue sample sites with *Phytophthora cinnamomi* result;
- Points located at sites known to be infested by *Phytophthora* species other than *Phytophthora cinnamomi*;
- Points located where field diagnosis is certain or almost certain of *Armillaria*;
- points requiring soil and tissue sampling;
- points located where samples have been taken, results pending;
- points located at ISDs, and
- points that need to be revisited for further examination.

3.4 Sampling

Any soil and tissue samples taken during the assessment will be to standards and prescriptions defined in Chapter 11 of FEM047. All samples are analysed in the Vegetation Health Services (DBCA) laboratory using best-practice techniques.

3.5 Determining Protectable areas

As defined by the Department of Parks and Wildlife (DPaW, 2015) protectable areas will be:

- Determined to be Uninfested, Uninterpretable or Temporarily Uninterpretable;
- Situated in areas receiving more than 600 millimetres rainfall a year or those that are water-gaining sites in the 400- to 600-millimetres a year rainfall range;
- Both positioned in the landscape and of sufficient size such that it is adjudged that the pathogen will not autonomously engulf them in the short term (greater than four hectares with an axis greater than 100 metres);
- Areas of high conservation and/or socio-economic value (for example, areas with a known population of a susceptible species of threatened flora), and;
- Areas where human vectors are controllable.

Protectable area standards only apply to DBCA managed lands. There are no standards or guidelines for land not managed by DBCA. Protectable area standards on non DBCA managed

lands are normally based on the DBCA standards and determined through consultation between the interpreter and the client.

4 Results

4.1 Disease distribution

The majority (58.45 ha) of the study area was excluded from assessment due to being either degraded or devoid of vegetation (Figure 2). A single *Phytophthora* dieback infestation, comprising 1.15 ha was identified and mapped during the assessment. An additional 4.45 ha of the study area was observed to be uninfested. A desktop assessment indicated that *Phytophthora* had not previously been identified within, or in close proximity to the study area.

4.2 Other *Phytophthora* species

No other species of *Phytophthora* were observed during the assessment.

4.3 Ecosystem health

The vegetation in the uninfested area exhibited good health, albeit with reduced species diversity and no midstorey. The vegetated areas that were excluded from assessment were degraded with little or no understorey.

4.4 *Armillaria luteobubalina*

No evidence of *Armillaria* Rot Disease (ARD) was observed during the assessment.

4.5 Allocation of categories

Table 3 - Assessment area statement

| Category | Area (ha) | Protectable Area (ha) | % of Assessed Area |
|-----------------------------|-----------|-----------------------|--------------------|
| Infested | 1.15 | 0.00 | 20.00 |
| Uninfested | 4.45 | 4.40 | 80.00 |
| Uninterpretable | 0.00 | 0.00 | 0.00 |
| Temporarily Uninterpretable | 0.00 | 0.00 | 0.00 |
| Assessed Area | 5.60 | | |
| Excluded | 58.45 | | |

4.6 Protectable and unprotectable areas

The uninfested portion of study area is considered to be protectable in its entirety. Because the study area is not located within DBCA managed lands, there is no requirement to apply the DBCA standards (DPaW, 2015) for protectable areas. However, if the DBCA standards are applied, the uninfested section of the study area meets the requirements for a 'protectable area' and it is recommended that the area be considered protectable.

4.7 Sample results

Two soil and tissue samples were taken during the assessment, one of which tested positive for the presence of *Phytophthora cinnamomi* (Figure 2).

The following table (**Table**) shows the need for sampling to assist the disease diagnosis process (Department of Parks and Wildlife, 2015)

Table 4 - Determination of requirement for sampling

| Observable factors indicating likelihood of <i>Phytophthora cinnamomi</i> presence | | | | |
|--|--------------------------------|---------------------|--------------------------|---------------------|
| ISD type | Multiple | Cluster | Scattered | Isolated |
| Species | Some or most indicator species | Any indicator plant | Any indicator plant | Any indicator plant |
| Pattern development | Obvious | | | Not obvious |
| Chronology | Obvious | | | Not obvious |
| Topographic situation | Gully/flat | Lower to mid slope | Mid slope to upper slope | Ridge |
| Causal agent | Obvious | | | Not obvious |
| Requirement for soil and tissue sample | Low | High | High | Low |

Samples may also be taken for the following strategic reasons:

- Supporting infested field diagnosis;
- Incipient, subtle or cryptic disease in apparent uninfested sites, or
- Altering mapped infested area boundaries.

5 Discussion

The majority of the study area was cleared farmland that was excluded from assessment. Small sections of the study area contained remnant vegetation that was degraded and contained little or no understorey/midstorey vegetation. These areas were also excluded from assessment.

The mappable vegetation also exhibited evidence of historical disturbance (possibly grazing), however there was still a sufficient coverage of reliable indicator species in these areas, allowing the dieback status to be determined.

The source of the identified infestation is not entirely clear, however it appears to be associated with the disturbance to the north and northeast, where a residential property was previously located. Disease expression is currently represented by occasional, scattered *X. preissii* deaths (Figure 2 & 3).



Figure 2 - *Xanthorrhoea preissii* death on the disease front



Figure 3 – Recent disease expression

If the vegetation in the uninfested area is to be retained, it would likely benefit from phosphite treatment, which should increase the survival rate of susceptible plants and slow the advancement of the disease front.

The following hygiene measures are recommended:

- Soil and plant material should not be transported from the excluded or infested sections of the study area for use at any other protectable area.
- Soil and plant material of infested or unknown Dieback status should not be introduced to the uninfested section of the study area.
- Vehicles and machinery, tools and equipment, boots etc. should be clean prior to entering the uninfested area. This is best achieved by cleaning down at the depot prior to departure, which should ensure that vehicles and equipment are clean on arrival to site.

- After working in the infested area, vehicles and machinery, tools and equipment, boots etc. should be cleaned prior to working at any other sites containing protectable areas.

6 Bibliography

Commonwealth of Australia. (2018). *Threat abatement plan for disease in natural ecosystems caused by Phytophthora cinnamomi*.

Department of Parks and Wildlife. (2015). *FEM047 Phytophthora Dieback Interpreter's Manual for lands managed by the department*. Unpublished.

Keighery, B. (1994). *Bushland Plant Survey: a Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc.).

7 Appendices

7.1 Sample summary

| Sample | Plant Sampled | Easting | Northing | Result |
|--------|------------------------------|---------|----------|----------|
| 1 | <i>Xanthorrhoea gracilis</i> | 406605 | 6426684 | Negative |
| 2 | <i>Xanthorrhoea preissii</i> | 406899 | 6426749 | Positive |

Vegetation Health Service – Phytophthora sample information sheet

FORM FEM046

SEND TO: VHS Lab, Ecosystem Health Branch - DBCA, 17 Dick Perry Ave KENSINGTON 6151 Phone: (08) 9219 9587

CONTACT DETAILS of sender
 Name: Glenax Consulting
 Phone No: _____ Email: _____
 DBCA Office or Company Name: _____

VHS use only
 Date received: 12.7.22
 Date reported: 19.7.22
 Notify DPIRD? Y / N
 (VHS use only)

Job Type (Please indicate)
 DBCA Alcoa
 Recruit EPC
 Private Other

GDA (L)
 GDA 94

| VHS Identification No. (VHS use only) | Sample Date | Sample label (Give location Block or Shire, etc. and sample no.) | Plant Genus sampled | Plant Species sampled | Site Impact (Z) | Zone 50 or 51 | Map Reference (3) | Land Tenure (4) | RESULT Sub Y (5) | RESULT Sub N (5) | RESULT Sub (5) |
|--|-------------|---|---------------------|-----------------------|-----------------|---------------|-------------------------|-----------------|------------------|------------------|----------------|
| VHS 44484 | 30-06-2022 | Kiernan Park, SR01 | Xan | gra | L | 50 | E 406 605 N 642 6684 | P | NEG | | |
| VHS 44485 | 30-06-2022 | Kiernan Park, SR02 | Xan | pre | L | 50 | E 406 899 N 642 6749 | P | CIN | | |
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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), Westral (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
 5. Result codes used - **CIN** = *Phytophthora cinnamomi*, **MUL** = *P. multivora*, **PSEUDOCRY** = *P. pseudocryptoga*, **PI** = *P. invidiosa*, **ARE** = *P. arenaria*, **ELO** = *P. elongata*, **THE** = *P. thermophila*, **PN** = *P. nicotianae*, **CON** = *P. constricta*, **ALT** = *P. allica*, **NEG** = negative, **SUB** = subcultured for further tests
Please Note: a) It cannot be concluded that an entire site or an entire stockpile of basic raw material is dieback-free from a single or a small number of samples where *Phytophthora* was not detected (i.e. a NEG result), and; b) Information from your samples will be incorporated into the VHS database.
COMMENTS:

Effective from: 5 September 2006
 Last updated: 23/07/2021

Custodian: Plant Diseases Program Coordinator
Approved by: Ecosystem Health Branch Manager

7.2 Phytophthora Dieback Occurrence map

The provided map is the Phytophthora Dieback occurrence map.

The project area is displayed as a blue boundary line. The following categories are also shown (if present in the project area):

- Excluded (shown as uncoloured). Areas of high disturbance where natural vegetation has been cleared and is unlikely to recover to a level that is interpretable.
- Infested (shown as a red). Determined from the assessment to have plant disease Phytophthora Dieback.
- Uninfested (shown as green). Determined from the assessment to be free of plant disease Phytophthora Dieback.
- Uninterpretable (shown as a purple). Undisturbed areas where susceptible plants are absent, or too few to decide the presence or absence of Phytophthora Dieback.
- Not yet resolved (shown as pale blue). Phytophthora occurrence diagnosis cannot be made at the time of assessment because of inconsistent or incomplete evidence.
- Temporarily Uninterpretable (shown as grey). Areas of disturbance where natural vegetation is likely to recover.

Additional spatial data that may be shown include:

- Sample location with result, and;

Phytophthora Dieback is a dynamic disease with autonomous spread of the pathogen not expected to be more than three metres a year upslope in average conditions. In unusual circumstances, such as heavy spring, summer or autumn rainfall, the spread of the disease may be rapid and breach the buffers. These buffers however provide the best chance of hygienic operating conditions within protectable areas over a set twelve-month period. The information on *Phytophthora* occurrence maps then becomes obsolete.

7.3 Mapping Metadata

| DATASET DESCRIPTION | |
|---------------------------|---|
| Title | Kiernan Park Dieback Assessment |
| Data Created | 29-06-2022 |
| Date Last Updated | 03-08-2022 |
| Abstract | Dieback occurrence and sample location shapefiles associated with the Kiernan Park Dieback Assessment |
| Purpose | Phytophthora dieback occurrence mapping |
| Document Number | GC-22-1480 |
| Contact Organisation | Glevan Consulting |
| Contact Name | Simon Robinson |
| Contact Position | Phytophthora Dieback Interpreter |
| Contact Phone | 0427 113 336 |
| Contact Email | Simon.Robinson@glevan.com.au |
| Lineage | All field data recorded using ESRI Collector on a GPS enabled tablet. |
| Datum / Coordinate System | GDA94 Zone 50 |
| Geographic Description | 63.5 hectares of land on the corner of Kiernan Street and South Western Highway, Whitby. |
| Restrictions | None |

7.4 Shapefile spatial data

The shapefiles associated with the mapping are contained in the attached zip file called Kiernan Park Dieback Assessment.zip

