GLEVAN CONSULTING

Clean Energy Link Wangara - Neerabup Terminal Phytophthora Dieback Occurrence Report

Prepared for Western Power

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Client	Western Power
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Version History

Author	Reviewer	Version	Version Number	Submission Date
S. Hewitt	D. Delaporte	Draft	0.1	14-01-2026
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This report has been prepared in accordance with the scope of work agreed between Western Power 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 was commissioned by AECOM Australia Pty Ltd on behalf of Western Power to conduct a Phytophthora Dieback assessment to determine the disease status of the Wangara - Neerabup Terminal Project Area as part of the Clean Energy Link – North program. The Wangara - Neerabup Terminal Project Area spans approximately 23 kilometres of public, private and Department of Biodiversity, Conservations and Attractions (DBCA) land. The most northern part of the Project Area can be found to the east of the Neerabup Terminal Substation in between Skink Road and Cecil Road. The most southern points can be found spanning approximately 5 kilometres along Ocean Reef Road until the western side of the Wanneroo Road intersection. The Wangara - Neerabup Terminal Project Area consists of remnant bushland, paddocks, powerline corridors, public roads and private properties and businesses.

The Project Area totalled 218.78 hectares (ha) with 8.26 ha (3.77 %) of remnant bushland classified as Uninfested with sufficient Indicator Species present. 3.58 ha (1.64 %) was classified as Infested with subtle to moderate disease expression, 203.28 ha (92.92 %) was classified as Excluded due to the complete lack of native vegetation, and the remaining 3.66 ha (1.67 %) was classified as Permanently Uninterpretable to dominant non-susceptible species often found in wetlands.

The assessment commenced on the 24th of November and completed on the 27th of November 2025 by Shannon Hewitt and Jade Blair of Glevan Consulting. The assessment was carried out in accordance with the *Phytophthora* Dieback Interpreter's Manual for lands managed by the DBCA (Department of Parks and Wildlife, 2015).

Uninfested vegetation within the Project Area was observed to be in good overall condition with sufficient indicator species present. Indicators throughout include *Banksia attenuata, Banksia menziesii, Banksia ilicifolia, Stirlingia latifolia, Xanthorrhoea preissii, Adenanthos cygnorum, Patersonia occidentalis, Eucalyptus todtiana, Lomandra* species*, Dasypogon* species*, Conospermum* species*, Petrophile linearis, Petrophile* species and *Grevillea* species*.*

Two soil and tissue samples were taken over the course of the assessment, both of which tested negative for the presence of *Phytophthora cinnamomi*.

The validity of the hygiene boundaries mapped for this project is twelve months from the completion of the assessment.

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Glossary

Assessment Area	The portion of the Project Area where Phytophthora occurrence assessment is possible or will be possible after vegetation recovery.
Biomass	The total quantity or weight (density) of organisms in a given area.
Buffer	The area between the edge of visible disease symptoms and demarcation.
Clean On Entry	A requirement at a defined, signposted point where entering machinery and vehicles are to be free of soil, plant, and other material to minimise the risk of spreading weeds, pests and diseases.
DBCA	Department of Biodiversity, Conservation and Attractions.
Demarcation	The physical installation and representation of boundaries between hygiene categories after interpretation.
Phytophthora Dieback	The disease of plants caused by infection by the soil-borne organisms of the genus *Phytophthora*, of which *P. cinnamomi* is the most widespread and destructive.
Disease Impact	The degree of harm caused by Phytophthora Dieback (high, moderate, low).
Excluded Area	An area of high disturbance where natural vegetation is unlikely to recover.
Host	A plant species that may be Infested with the pathogen but not cause disease.
Indicator Species	Plant species susceptible to Phytophthora disease and reliably show early symptoms.
Infection	The invasion of the disease to an individual plant and not the population.
Infestation	The invasion of the disease into a population of plants.
Infested	An area that a registered interpreter has determined is expressing disease symptoms that indicate the presence of the pathogen *P. cinnamomi*.
Incipient Disease	A disease that is not visibly symptomatic.
Interpretation	Determining disease presence or absence in natural ecosystems using observable factors.
Not Yet Resolved	Phytophthora occurrence diagnosis cannot be made because of inconsistent evidence.
Pathogen	Phytophthora species.
Phytophthora Occurrence Assessment	The entire scope of work that relates to the delivery of a Phytophthora occurrence map and report.
Permanently Uninterpretable	A natural area with inadequate visible symptoms present to make a diagnosis.
Project Area (Study Area)	The proponent's area of interest, including the area where disturbance activities could occur, including access and egress to activity areas.
Protectable Area	Portions of the Project Area over which hygiene management rules for the plant pathogen *Phytophthora*, including clean on entry, will apply. These areas are generally free of disease.
Susceptible	Likely or liable to be harmed by Phytophthora pathogen.
Uninfested	An area that a registered interpreter has determined may be free of plant disease symptoms that indicate the presence of the pathogen *P. cinnamomi*.
Temporarily Uninterpretable	A naturally vegetated area that has had disturbance and is likely to recover from that disturbance in the short term.
Unprotectable	A disease-free area that is likely to become infested within a given time.
Vector	Any agent that acts as a carrier or transporter.

1. Introduction

Glevan Consulting was commissioned by AECOM Australia Pty Ltd on behalf of Western Power to conduct a *Phytophthora* Dieback assessment to determine the disease status of the Wangara - Neerabup Terminal Project Area as part of the Clean Energy Link – North program. The Wangara - Neerabup Terminal Project Area was composed of 218.78 hectares (ha).

The *Phytophthora* Dieback occurrence assessment was completed in November 2025 by Shannon Hewitt and Jade Blair of Glevan Consulting. Miss Hewitt is accredited by the Department of Biodiversity, Conservations and Attractions (DBCA) in the detection, diagnosis and mapping of *Phytophthora* Dieback disease (Interpreter Registration No: DPW PDI 45). This accreditation recognises the skills and experience of Miss Hewitt. All *Phytophthora* Dieback detection, diagnosis and mapping were completed in accordance with *FEM047 Phytophthora Dieback Interpreter's Manual for Lands Managed by the Department* (Department of Parks and Wildlife, 2015).

The validity of the hygiene boundaries mapped for this project is twelve months from the completion of the assessment. The *Phytophthora* Dieback occurrence categories will expire November 2026.

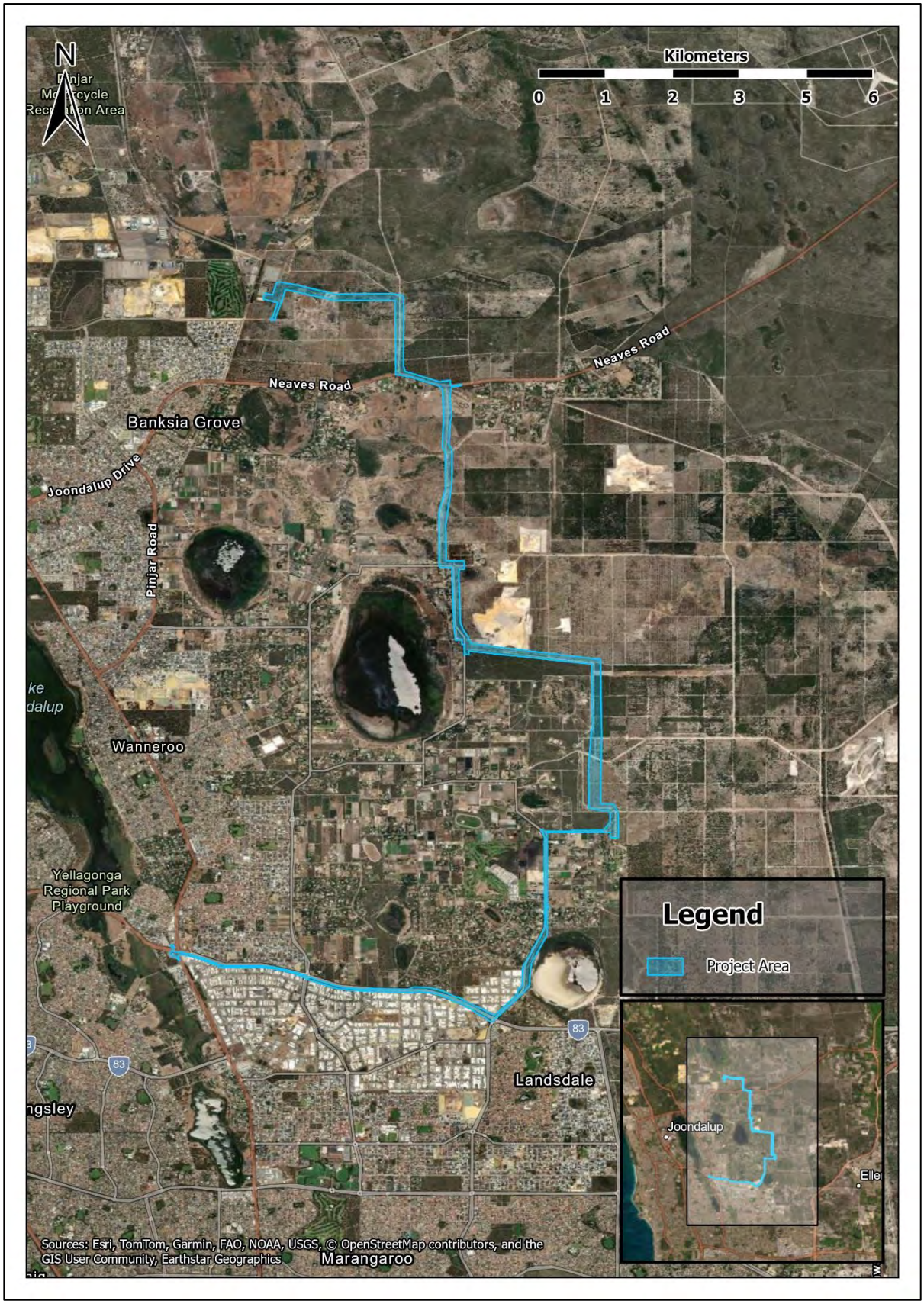

Figure 1 – Project Area.

2. Background – Phytophthora Species and Dieback Disease

Thousands of Australian native plant species are susceptible to *Phytophthora* Dieback (Dieback), a disease caused by the pathogen *P. cinnamomi* and other *Phytophthora* species. Whilst many root pathogens that cause disease are present within the Australian landscape, *P. cinnamomi* has caused the most significant impact to date and poses the biggest threat (Commonwealth of Australia, 2018). This disease is a significant threat to Australia's biodiversity, placing important plant species at risk of death, local extirpation or even extinction. Its 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).

P. cinnamomi is one of at least 32 *Phytophthora* species that exist in Australia. Whilst *P. cinnamomi* has to date had the largest impact on the Western Australia vulnerable zone, other destructive *Phytophthora* species are emerging in Australia such as *P. arenaria, P. constricta, P. cryptogea, P. elongata, P. gregata, P. megasperma* and *P. multivora. P. multivora* is notable in having been linked to declines in vegetation within the Western Australian vulnerable zone (Commonwealth of Australia, 2018).

P. cinnamomi is a microscopic water mould that belongs to the class Oomycetes. Oomycetes organisms are filamentous and absorptive and reproduce both sexually and asexually. *Phytophthora* species are considered parasitic, behaving 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.

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. A population of hosts is made up of susceptible, infected and immune or resistant individuals.

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

The plant host is a highly variable part of the disease triangle. Assessment sites may range from having no susceptible hosts present through to almost all plants present in the environment demonstrating high levels of susceptibility to *P. cinnamomi*. Over 2000 potential host species for the *P. cinnamomi* pathogen exist in Western Australia alone (Commonwealth of Australia, 2018). Skilled Dieback Interpreters are able to observe and interpret disease presence using hundreds of different susceptible plant species (referred to as indicator species) across multiple vegetation communities. Interpreters are able to recognise when disease detection is not possible due to insufficient hosts being present within an area.

Within the vulnerable zone of Western Australia, three main family groups are regarded as highly susceptible to *Phytophthora* Dieback disease:

- Proteaceae
- Ericaceae
- Xanthorrhoeaceae.

The Proteaceae plant family demonstrates a high level of susceptibility to the *P. cinnamomi* pathogen. Genera such as *Banksia*, *Isopogon*, *Adenanthos, Persoonia, Petrophile* and *Xylomelum* demonstrate high susceptibility, providing reliable indicators through much of the vulnerable zone of Western Australia. *Andersonia, Astroloma* and *Leucopogon* species from the Ericaceae family also demonstrate high levels of susceptibility, whilst other species within the family do not demonstrate the same level of vulnerability to the pathogen. All species contained in the Xanthorrhoeaceae family are considered to be reliable indicator species.

Not all species within the vulnerable zone of Western Australia are susceptible to Dieback, with some species demonstrating a resistance to the pathogen. Resistance to the pathogen is recognised within genera such as *Acacia, Calothamnus, Eucalyptus* (excluding *Eucalyptus marginata*), *Lepidosperma* and *Melaleuca*, among others. Resistance to *P. cinnamomi* is dependent on a multitude of factors such as the ability for a species to compartmentalise the infected part of a root or the plants ability to quickly regrow new roots in order to replace those infected by the pathogen (Commonwealth of Australia, 2018). It has been recognised under field conditions that herbaceous perennials, annuals and

geophytes demonstrate greater resistance to *Phytophthora* Dieback compared to woody perennials (Commonwealth of Australia, 2018).

Where species considered to be resistant to the *P. cinnamomi* pathogen are observed to be dying suddenly, Armillaria Rot Disease (ARD) may be considered to be the cause of death. ARD is caused by the *Armillaria luteobubalina* fungus. Drought conditions are another contributing cause of death other than ARD to *Phytophthora* resistant species.

Temperature, rainfall and soil type all affect the impact that Dieback has on an area. *P. cinnamomi* does not generally cause significant vegetation declines in areas that receive less than 400 millimetres of rain annually and occur north of latitude 30º (O'Gara et al., 2005 as cited in Commonwealth of Australia, 2018). Within Western Australia, the vulnerable zone exists in areas of Mediterranean climate (warm to hot, dry summers and mild to cool, wet winters) where annual rainfall exceeds 400 millimetres in the southwest of Western Australia. The most significant impact of the pathogen is observed in areas receiving an annual rainfall of above 800 to 1000 millimetres.

Soil characteristics also play a significant role in the occurrence of Dieback. Moisture is essential for the survival of the *Phytophthora* pathogen and for sporangia production, with wet soil conditions and warm temperatures favouring the release of motile zoospores from the sporangia. Optimal temperatures for the survival and reproduction of the pathogen are between 21ºc to 30ºc, a temperature range that is common through the vulnerable zone of Western Australia (Department of Parks and Wildlife, 2015). The growth and reproduction of the pathogen is also affected by soil pH, with a favourable pH range of between five and six (mildly acidic). Strong host resistance is observed in areas with a high level of soil fertility, creating a less favourable soil environment for the pathogen.

Whilst autonomous (active) spread of the disease does occur, *P. cinnamomi* is passively spread (or vectored) by animals and human activity via the movement of soils, allowing the rapid infestation of a new area by the pathogen. The movement of even small pieces of vegetation or soil containing viable inoculum (zoospores, chlamydospores, oospores) can result in the spread of the pathogen. Passive spread by a vector can occur both overland and in subsurface water flow (Commonwealth of Australia, 2018). Human induced spread of the *P. cinnamomi* pathogen is a significant risk in the Western Australian landscape. Activities such as road construction and maintenance, commercial activities (timber harvesting and mining), off-road vehicle movement and bush walking activities can result in the spread of the disease should movement of Infested soil occur.

3. Materials and Methods

3.1. Project Area

Areas within the Project Area were categorised as Excluded if the vegetation was suffering from significant disturbance. Significant disturbance is based on Vegetation Condition Scale (Keighery, 1994) shown in Table 1. Any remaining area was categorised post-assessment into *Phytophthora* Dieback occurrence categories (Table 2).

Table 1 – Keighery (1994) Vegetation Condition Scale and Assessability (Department of Parks and Wildlife, 2015).

Assessability	Scale		Vegetation 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 – 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 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 (1994) disturbance rating of 3 or less Phytophthora occurrence categorisation is possible.	Infested - Determined to have plant disease symptoms consistent with the presence of *P. cinnamomi.*
	Uninfested - Determined to be free of plant disease symptoms that indicate the presence of *P. cinnamomi*
	Permanently Uninterpretable - Undisturbed areas where susceptible plants are absent, or too few to make a determination of the presence or absence of *P. cinnamomi.*
	Not yet resolved.
Vegetation structure temporarily altered.	Temporarily Uninterpretable - Areas of disturbance where natural vegetation is likely to recover.
Vegetation structure severely altered. Keighery (1994) disturbance rating 4 or greater. *Phytophthora* occurrence assessment is not possible	Excluded.

3.2. Assessment Method

Prior to assessment, all information relevant to the assessment was assembled to assist the interpretation process. This information included previous assessments of the area, historic sample results, history of burning and possible other disturbances. This process is referred to as the Desktop Assessment.

All *Phytophthora* Dieback detection, diagnosis and mapping are performed to standards and procedures defined in *FEM047 Phytophthora Dieback Interpreter's Manual for lands managed by the department* (Department of Parks and Wildlife, 2015). These procedures are grounded on the presence of indicator species in the vegetation, and the observance of deaths in these plants. An indicator species is a plant species that is reliably susceptible to *P. 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 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 (Department of Parks and Wildlife, 2015), including:

- Armillaria Root Disease,
- 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 *Phytophthora* Dieback assessment process is undertaken using the following basic sequence as documented in *FEM047 Phytophthora Dieback Interpreter's Manual for lands managed by the department* (Department of Parks and Wildlife, 2015):

- Observe,
- Hypothesise,
- Undertake evidence collection,
- Form a diagnosis,
- Test the diagnoses (sample results, previous assessment, second assessment),
- Evidence is reviewed with a new hypothesise formed, if necessary,
- Final field diagnoses determined.

The assessment was conducted using the methodology of a combination of linear and comprehensive assessments.

3.3. Collection of Evidence of Phytophthora Dieback

During the assessment process, the collection of evidence to support the field diagnosis was recorded using a tablet running the Environmental Systems Research Institute (ESRI) Field Maps 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 Permanently Uninterpretable classification, or
- Areas of disturbance, which are Temporarily Uninterpretable or Excluded.

Additional waypoints recorded include:

- Points requiring soil and tissue sampling,
- Points located where samples have been taken,
- Points located at indicator species deaths, and
- Points that need to be revisited for further examination.

Evidence recorded during a comprehensive assessment is collected along a series of transect lines spaced 50 meters apart, with evidence collected no more than every 100 meters along the transect lines. Linear assessments represented by an assessment area 25 meters either side of the centre line are assessed using a minimum of a single pass on each side of the centre line. Assessment areas that exceed 25 meters either side of the centre line are either assessed using the methodology of a comprehensive assessment or additional transect lines are established parallel to the centre line at increments of 50 meters.

Waypoint evidence, sample sites and results, and field demarcations are then digitised into a *Phytophthora* Dieback Occurrence Map according to the standards defined by the *FEM047 Phytophthora Dieback Interpreter's Manual for lands managed by the department* (Department of Parks and Wildlife, 2015).

3.4. Demarcation

The *Phytophthora* Dieback occurrence categories were demarcated in the field using the appropriate flagging tape (Table 3) tied to the vegetation at an appropriate buffer width. An appropriate buffer width is determined by Interpreters during the course of the assessment, and takes into consideration the following:

- Natural autonomous spread of the pathogen,
- Likely presence of incipient disease,
- Potential for surface water to flow into an area from an infestation,
- Current rate of spread,

- Location of natural drainage lines, such as creeks and brooks,
- Other site factors, including soil types that increase or decrease the rate of spread and degree of slope.

At a minimum, an up-slope buffer of 15 meters and a down-slope buffer width of 25 meters will be applied.

Table 3 – Demarcation Flagging Colours.

Boundary	Tape Colour and Width
Phytophthora Dieback Infested	Fluoro pink 25 mm
Permanently Uninterpretable, Temporarily Uninterpretable and Excluded (when required)	Pink and black striped ('tiger tape') 25 mm
Permanently Uninterpretable against Excluded and Temporarily Uninterpretable	Double band pink and black tiger tape
Armillaria infestation	Not usually demarcated, but if required, double flagging of pink and black tiger tape and fluoro pink 25mm.

3.5. Soil and Tissue Samples

Soil and tissue samples taken during the assessment were to standards and prescriptions defined in *FEM047 Phytophthora Dieback Interpreter's Manual for lands managed by the department* (Department of Parks and Wildlife, 2015). While species specific sampling techniques were undertaken, the general process to collect a soil and tissue sample is as follows:

- Tools and equipment are checked for the presence of soil and plant matter. Sterilisation will have occurred at the completion of the previous sample. Re-sterilise if required.
- Using the sampling tool (long or short handle mattock), dig down to expose the stem base and roots of the target plant, to a minimum depth of 30 cm.
- Remove sections of the root material and stem base from all sides of the target plant and place into a plastic sample bag.
- Collect several handfuls of soil from different depths around the base of the target plant and place into the plastic sample bag.
- Complete two metal tags with the sample tag information, including project name, sample number, company details, sample date and Interpreter initials. Place one tag into the bag.
- Complete a paper tag with the above information and secure to the sample bag.

- Mark the location of the sample with flagging tape and secure the second metal information tag to a plant within the immediate vicinity of the flag.
- Record the sample location and required information as an evidence point using ESRI Field Maps.
- Remove any material from the sampling tools and sterilise.
- Store the sample(s) in a cool location away from direct sunlight until transported to the laboratory.

All samples were analysed in the Vegetation Health Services (DBCA) laboratory using best-practice techniques.

Taking a soil and tissue sample from dead and dying plants is an integral part of assessment – although in some cases sampling is not essential. Sample results provide evidence to support field diagnostic decisions. The following table (Table 4) shows the need for sampling to assist the disease diagnosis process.

Table 4 – Determination of Requirement for Sampling (Department of Parks and Wildlife, 2015).

Observable factors indicating likelihood of *Phytophthora cinnamomi* 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.

3.6. Determining Protectable Areas

Following the determination of *Phytophthora* Occurrence categories, all interpretable vegetation was assessed for protectability, using the Department of Biodiversity, Conservation and Attractions (DBCA) Protectable Areas criteria.

The *FEM047 Phytophthora Dieback Interpreter's Manual for lands managed by the department* (Department of Parks and Wildlife, 2015) defines 'Protectable Areas' as those that:

- Have been determined to be free of the pathogen *Phytophthora* spp. by a registered Dieback Interpreter (all susceptible indicator plant species are healthy and no plant disease symptoms normally attributed to *Phytophthora* Dieback are evident),
- Consists of areas where human vectors are controllable (e.g., not an open road, private property), and
- 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), or
- Includes areas of high conservation and/or socio-economic value (for example, a small Uninfested area with a known population of a susceptible species of Threatened flora).

Areas deemed Unprotectable are displayed on the *Phytophthora* Dieback Occurrence Map (See Section 7.1) as grey hashed areas. By default, all areas not displayed as Unprotectable on the *Phytophthora* Dieback Occurrence Map have been categorised as Protectable.

4. Assessment Results

4.1. Desktop Assessment

Landforms and Vegetation

The Department of Biodiversity, Conservation and Attractions' Vegetation Complexes - Swan Coastal Plain (DBCA-046) dataset (Department of Biodiversity, Conservation and Attractions, 2018) documents five Vegetation Complexes within the Project Area (Table 5).

Table 5 – Vegetation Complexes within the Project Area.

Vegetation Complex	Description
Bassendean Complex-North (43)	Woodland of *Eucalyptus marginata* subsp. *marginata-Corymbia calophylla* and low woodland of *Melaleuca preissiana-Banksia littoralis* on slopes in the subhumid zone.
Bassendean Complex-Central and South (44)	Open forest of *Eucalyptus marginata* subsp. *marginata-Corymbia calophylla* mixed with *Eucalyptus patens* on slopes, *Eucalyptus rudis* and *Banksia littoralis* on valley floors in the humid zone.
Bassendean Complex-North Transition (45)	Open forest of *Corymbia calophylla-Eucalyptus marginata* subsp. *marginata* with some *Eucalyptus wandoo, Eucalyptus patens* and *Eucalyptus cornuta* on slopes and woodland of *Eucalyptus rudis-Melaleuca rhaphiophylla* on lower slopes in subhumid and semiarid zones.
Karrakata Complex Central and South (49)	Open woodland of *Allocasuarina fraseriana-Banksia* spp.-*Xylomelum occidentale-Nuytsia floribunda* on sandy soils on valley slopes in the subhumid zone.
Pinjar Complex (54)	Mosaic of woodland of *Eucalyptus marginata* subsp. *marginata-Corymbia calophylla* on slopes, and woodland of *Eucalyptus occidentalis-Melaleuca cuticularis-Melaleuca rhaphiophylla*, low woodland of *Melaleuca preissiana-Banksia littoralis* and tall shrublands of *Melaleuca viminea* on broad depressions in humid to semiarid zones.

The Native Vegetation Extent (DPIRD-005) dataset (Department of Primary Industries and Regional Development, 2025) indicates that the majority of the Project Area does not contain native vegetation.

A number of reliable indicator species are expected to occur within the intact vegetation within the Project Area such as *Banksia* species and *Eucalyptus marginata*. It is expected that the Project Area will offer good Phytophthora Dieback disease expression in the interpretable areas if *P. cinnamomi* were present.

Fire History

Analysis of the DBCA Fire History (DBCA-060) database (Department of Biodiversity, Conservation and Attractions, 2025) indicates that multiple fires have been recorded along the length of the Project Area over recent years. The most recent fires occurring in 2020, 2021, 2023 and 2024. No native vegetation associated with the wildfires reside within the Project Area and won't affect the results of the assessment. It is expected that the vegetation will have recovered from the fire disturbance at the time of the assessment.

Historical Assessments

Review of Glevan Consulting's database and publicly available data from the *Phytophthora* Dieback Occurrence - Infested Only (DBCA-082) dataset (Department of Biodiversity, Conservation and Attractions, 2025) does show previous recoveries of *Phytophthora* from within the Project Area. Three positive samples can be found along Joyce Road and Steel Road, taken in 2021 by Glevan Consulting. Contextual *Phytophthora* Dieback information is visualised in Figure 2.

Rainfall

The long-term annual average rainfall (1905 to 2025) recorded at the nearby Wanneroo Weather Station is 784.40 mm (Bureau of Meteorology, 2025), which means the Project Area is located in the 600 mm and above zone, where *Phytophthora* Dieback occurrence would not be restricted and would be expected to occur across the landscape.

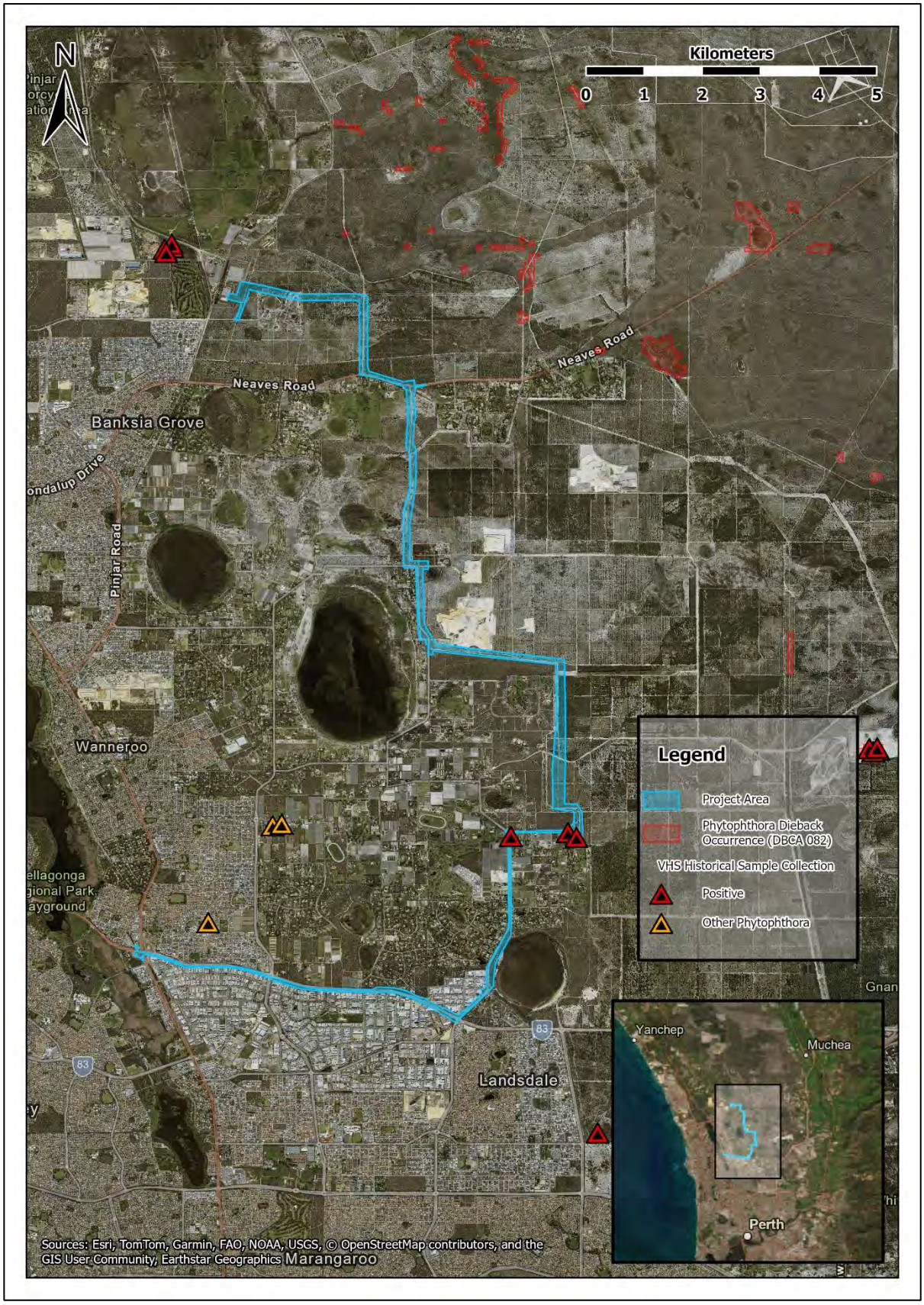

Figure 2 – Contextual Phytophthora Dieback information for the Project Area.

4.2. Phytophthora Dieback Distribution

The Project Area was determined to have two Infested areas within its boundary; one infestation can be found on the corner of Sydney Road and Joyce Road and resides within private property. The other infestation can be found further down Joyce Road and onto Steel Road. This infestation starts approximately 240 metres from the cul-de-sac on Joyce Road then continues into DBCA land onto Steel Road. The infestation then heads north along a sand track located 80 metre west of Steel Road for approximately 180 metres (Figure 5).

Vegetation classified as Uninfested appeared to be in good condition, with scatter indicators deaths seen throughout. These deaths can likely be attributed to drought at some sites due to their topographical positions and lack of observable factors attributed to *Phytophthora* Dieback. Indicator species found throughout the site included *Banksia attenuata, Banksia menziesii, Banksia ilicifolia, Stirlingia latifolia, Xanthorrhoea preissii, Adenanthos cygnorum, Patersonia occidentalis, Eucalyptus todtiana, Lomandra* species*, Dasypogon* species*, Conospermum* species*, Petrophile linearis, Petrophile* species and *Grevillea* species*.*

The *Phytophthora* Dieback Occurrence categories mapped during the assessment are displayed in Section 7.1; Figure 3 – Figure 6.

4.3. Disease Symptoms and Expression

A total of 3.58 ha (1.64 %) was classified as Infested. The Infested areas can be found in:

Sydney Road/Joyce Road infestation:

Scattered *Xanthorrhoea preissii* deaths of varying ages were observed within the private property, no evidence of disease movement as observed.

Joyce Road infestation:

The infestation along Joyce Road leads into private property where disease expression ranges from moderate to subtle, scattered *Banksia attenuata, Patersonia occidentalis, Xanthorrhoea preissii* and *Adenanthos cygnorum* could be found dead along the disease edge. The disease edge was also observed to have a perceptible biomass drop, where both susceptible and non-susceptible species

began to reduce. Within this low biomass area, introduced weeds were observed supressing any recolonisation of native species.

4.4. Permanently Uninterpretable Areas

3.66 ha (1.67 %) was classified as Permanently Uninterpretable due to the insufficient coverage of reliable indicator species. These areas were dominated by wetland vegetation, primarily *Melaleuca* species and *Xanthorrhoea preissii,* with only sparse occurrences of reliable indicator species, limiting the ability to accurately assess disease presence or absence.

4.5. Excluded Areas

Excluded areas are not able to be assessed for the presence of *Phytophthora* Dieback due to the level of disturbance of the vegetation, based on the Keighery (1994) Vegetation Condition Scale. 203.28 ha (92.92 %) of the Project Area was classified as Excluded due to the complete lack of native vegetation in cleared areas such as roads, powerline corridors, plantations, private properties and businesses. Native vegetation that has been overrun by non-native species such as weeds have also been included in the Excluded category.

4.6. Allocation of Categories

The *Phytophthora* Dieback Occurrence categorised mapped during the assessment are tabulated in Table 6.

Table 6 – Results Summary of the Project Area.

Category	Area (ha)	% of total area
Infested	3.58	1.64
Uninfested Protectable	8.26	3.77
Permanently Uninterpretable Protectable	3.66	1.67
Excluded Protectable	203.28	92.92
TOTAL AREA	**218.78**	**100**

4.7. Sample Summary

Two soil and tissue samples were taken over the course of the assessment, both of which tested negative for the presence of *P. cinnamomi* (Table 7).

Table 7 – Soil and Tissue Sample Results.

Sample Number	Plant Sampled	Easting	Northing	Result
SH01	*Stirlingia latifolia*	393124	6485069	Negative
SH02	*Xanthorrhoea preissii*	391503	6488151	Negative

5. Discussion

Glevan Consulting was commissioned by AECOM Australia Pty Ltd on behalf Western Power to conduct a Phytophthora Dieback assessment to determine the disease status of the Clean Energy Link Wangara - Neerabup Terminal Project Area. The assessment commenced on the 24th of November and was completed on the 27th of November 2025, with no new infestations of *Phytophthora* Dieback observed within the Project Area.

Within the Wangara - Neerabup Terminal Project Area, 8.26 ha (3.77 %) was classified as Uninfested with a sufficient presence of indicator species to support this classification. Uninfested areas included indictors such as *Banksia attenuata, Banksia menziesii, Banksia ilicifolia, Stirlingia latifolia, Xanthorrhoea preissii, Adenanthos cygnorum, Patersonia occidentalis, Eucalyptus todtiana, Lomandra* species*, Dasypogon* species*, Conospermum* species*, Petrophile linearis, Petrophile* species and *Grevillea* species*.* Uninfested areas showed adequate coverage of indicators with no deaths observed on the road or sandy firebreaks. The occasional isolated death could be observed within the Uninfested, these deaths however were not consistent with disease expression as seen on the disease edge and were determined to be background deaths.

203.28 ha (92.92 %) of the Project Area were classified as Excluded in areas where native vegetation is completely cleared or severely degraded. Private properties, private businesses, roads, infrastructure, farmland and native vegetation that has been dominated by invasive weeds preventing native species from colonising are often included within this category.

3.66 ha (1.67 %) was classified as Permanently Uninterpretable due to limited indicator species around the extent of the Lake Gnangara Park. Vegetation within this area consisted of predominantly of *Melaleuca* species, *Xanthorrhoea preissii* and very sparsely spread *Banksia* species. The dominant non-susceptible species present limited the ability to reliably assess for the presence or absence of *P. cinnamomi* within these areas and were thus determined to be Permanently Uninterpretable.

The remaining 3.58 ha (1.64 %) was classified as Infested, with disease expression varying from moderate to subtle. Multiple indicator species could be seen dead along the disease edge; lower biomass was also evident within the Infested areas. No movement was observed within the previously known infestations.

Phytophthora Dieback occurrence categories assigned as part of this assessment are valid for a period of 12 months from the date of survey and will expire in November 2026.

6. References

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7. Appendices

7.1. Phytophthora Dieback Occurrence Map

The provided map (Figure 3 – Figure 6) is the Phytophthora Dieback Protectable Areas map.

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

- Excluded (shown as yellow). Areas of high disturbance where natural vegetation has been cleared and is unlikely to recover to a level that is interpretable.
- Infested (shown as red). Determined from the assessment to have the plant disease caused by *P. cinnamomi*. Phytophthora Dieback caused by other *Phytophthora* species will be displayed as other colours, typically shades of orange and yellow.
- Uninfested (shown as green). Determined from the assessment to be free of plant disease Phytophthora Dieback.
- Permanently Uninterpretable (shown as purple). Undisturbed areas where susceptible plants are absent, or too few to decide the presence or absence of Phytophthora Dieback.

Additional spatial data that may be shown include:

- Sample location.

7.2. Mapping Metadata

Dataset Description	
Title	Dieback_Wangara_Neerabup_Terminal_Draft2
Data Created	12-01-2026
Date Last Updated	04-03-2026
Document Number	GC-25-0040
Contact Organisation	Glevan Consulting. Shannon Hewitt, Registered Interpreter, 0457 253 158, shannon.hewitt@glevan.com.au.
Lineage	All field data recorded using ESRI Field Maps application on a GPS enabled tablet.
Datum / Coordinate System	GDA2020 MGA Zone 50
Restrictions	None

Dataset Description	
Title	WP2A_SampleSites_Wangara_Neerabup_Terminal_Draft2
Data Created	12-01-2026
Date Last Updated	04-03-2026
Document Number	GC-25-0040
Contact Organisation	Glevan Consulting. Shannon Hewitt, Registered Interpreter, 0457 253 158, shannon.hewitt@glevan.com.au.
Lineage	All field data recorded using ESRI Field Maps application on a GPS enabled tablet.
Datum / Coordinate System	GDA2020 MGA Zone 50
Restrictions	None

Dataset Description	
Title	AECOM_Wangara_Neerabup_Terminal_2025_Evidence
Data Created	12-01-2026
Date Last Updated	04-03-2026
Document Number	GC-25-0040
Contact Organisation	Glevan Consulting. Shannon Hewitt, Registered Interpreter, 0457 253 158, shannon.hewitt@glevan.com.au.
Lineage	All field data recorded using ESRI Field Maps application on a GPS enabled tablet.
Datum / Coordinate System	GDA2020 MGA Zone 50
Restrictions	None

Dataset Description	
Title	WP1_SurveyDetails_Wangara_Neerabup_Terminal_Draft2
Data Created	12-01-2026
Date Last Updated	04-03-2026
Document Number	GC-25-0040
Contact Organisation	Glevan Consulting. Shannon Hewitt, Registered Interpreter, 0457 253 158, shannon.hewitt@glevan.com.au.
Lineage	All field data recorded using ESRI Field Maps application on a GPS enabled tablet.
Datum / Coordinate System	GDA2020 MGA Zone 50
Restrictions	None

Dataset Description	
Title	AECOM_Wangara_Neerabup_Terminal_2025_Protectable_Areas
Data Created	12-01-2026
Date Last Updated	04-03-2026
Document Number	GC-25-0040
Contact Organisation	Glevan Consulting. Shannon Hewitt, Registered Interpreter, 0457 253 158, shannon.hewitt@glevan.com.au.
Lineage	All field data recorded using ESRI Field Maps application on a GPS enabled tablet.
Datum / Coordinate System	GDA2020 MGA Zone 50
Restrictions	None

7.3. Shapefile Spatial Data

Shapefile Spatial Data	
File Contents	**File Name**
Occurrence	Dieback_Wangara_Neerabup_Terminal_Draft2
Samples	WP2A_SampleSites_Wangara_Neerabup_Terminal_Draft2
Evidence	AECOM_Wangara_Neerabup_Terminal_2025_Evidence
Project Area	WP1_SurveyDetails_Wangara_Neerabup_Terminal_Draft2
Protectable Areas	AECOM_Wangara_Neerabup_Terminal_2025_Protectable_Areas

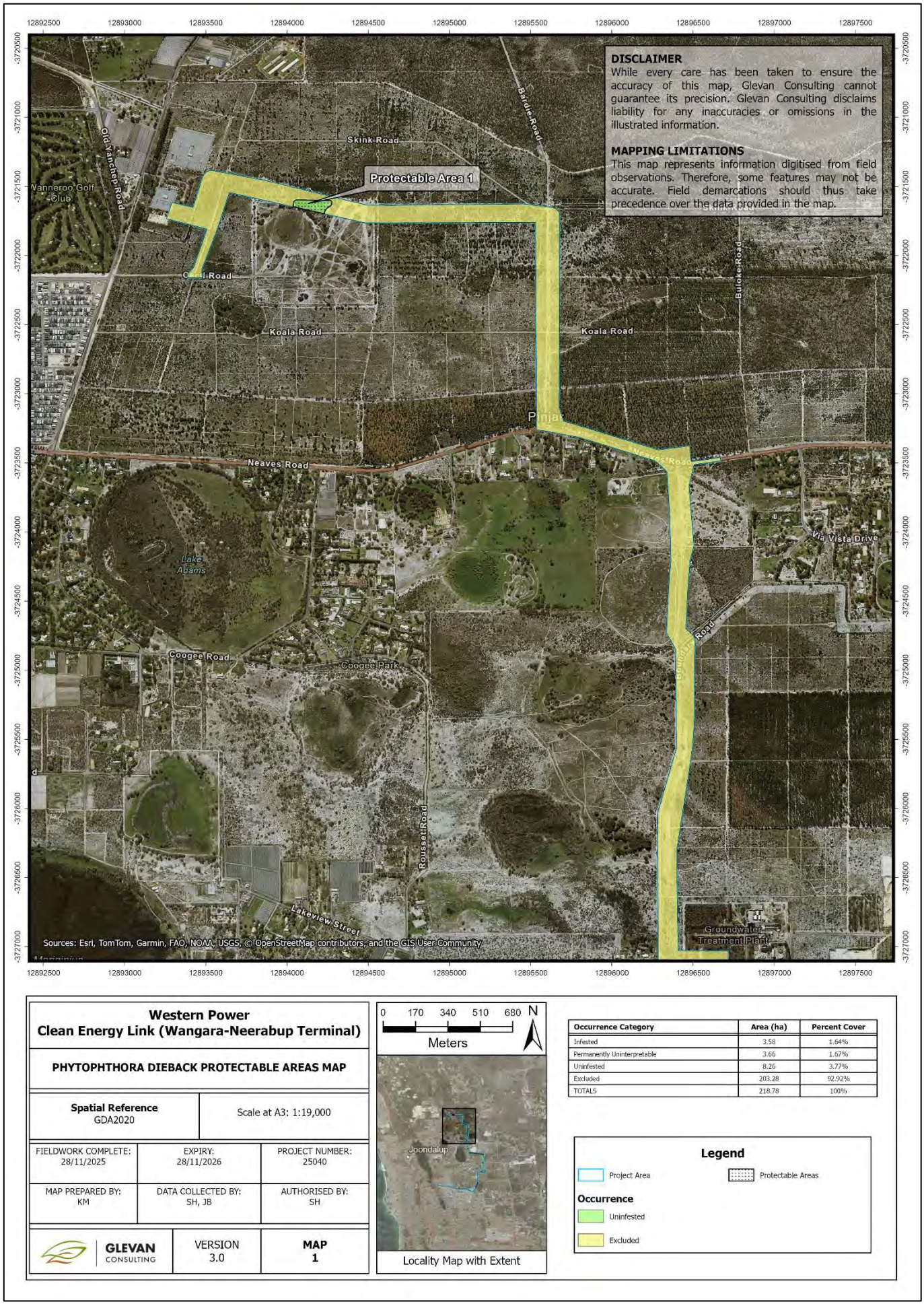

Figure 3 – Phytophthora Dieback Protectable Areas Map 1.

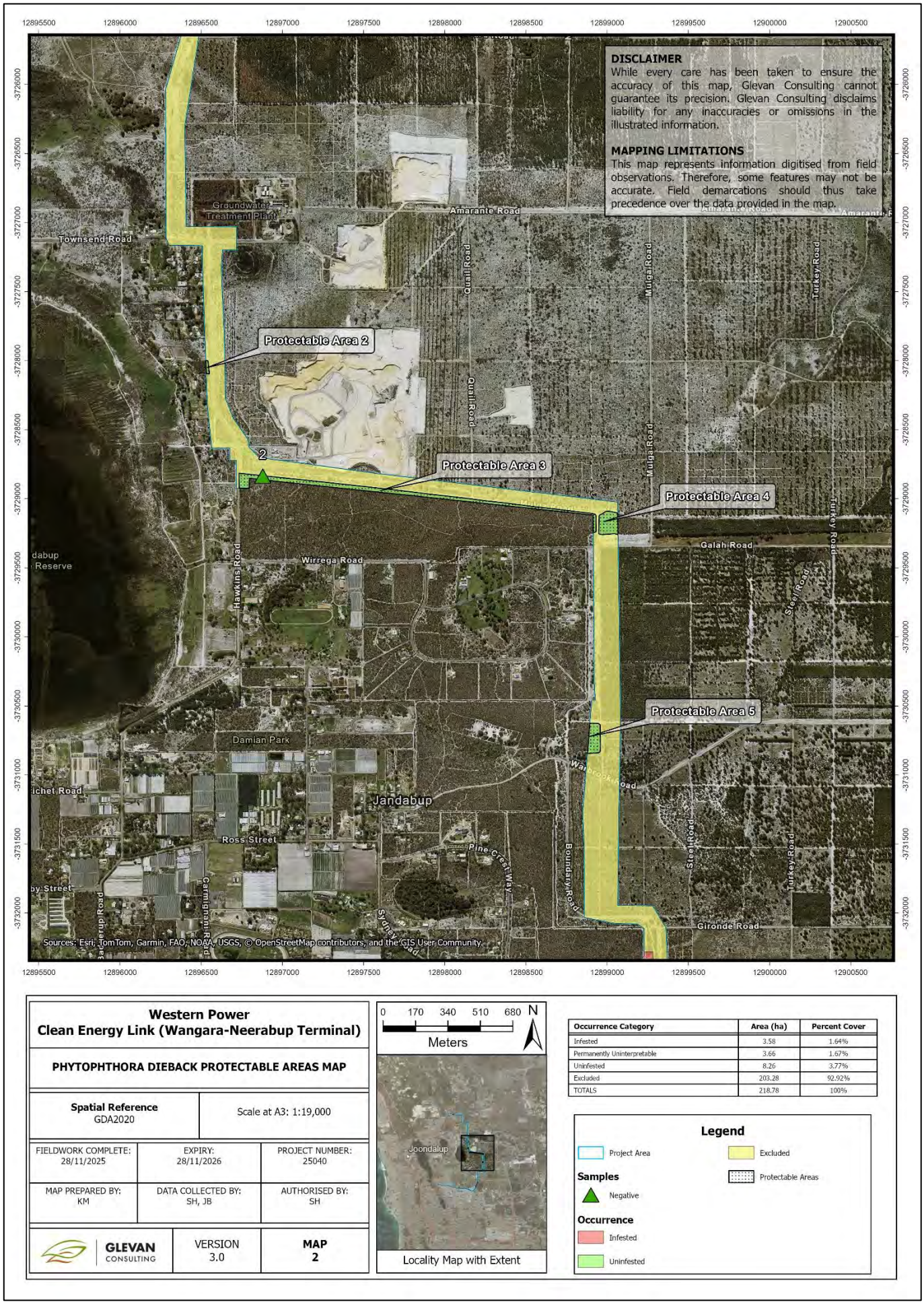

Figure 4 – Phytophthora Dieback Protectable Areas Map 2.

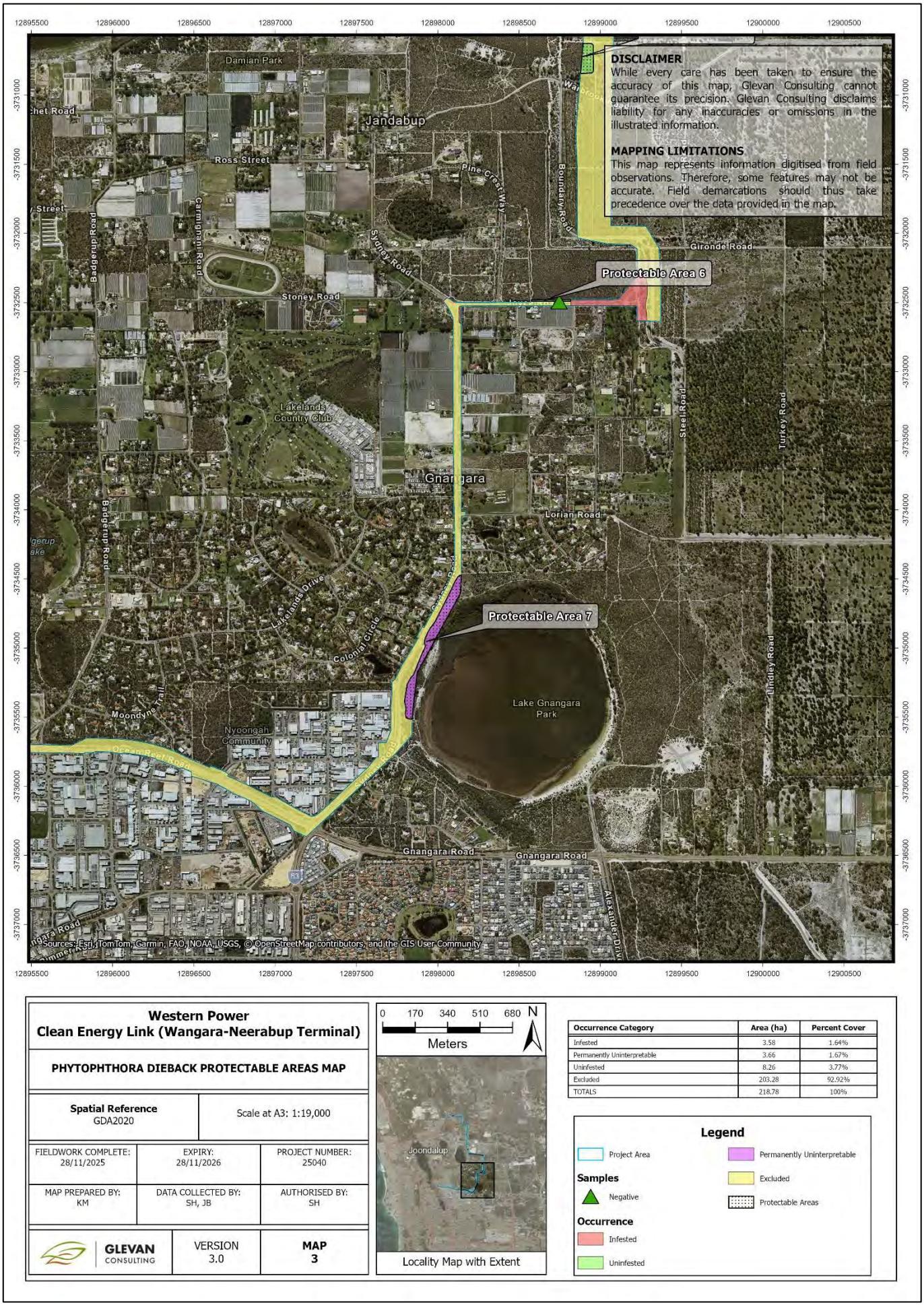

Figure 5 – Phytophthora Dieback Protectable Areas Map 3.

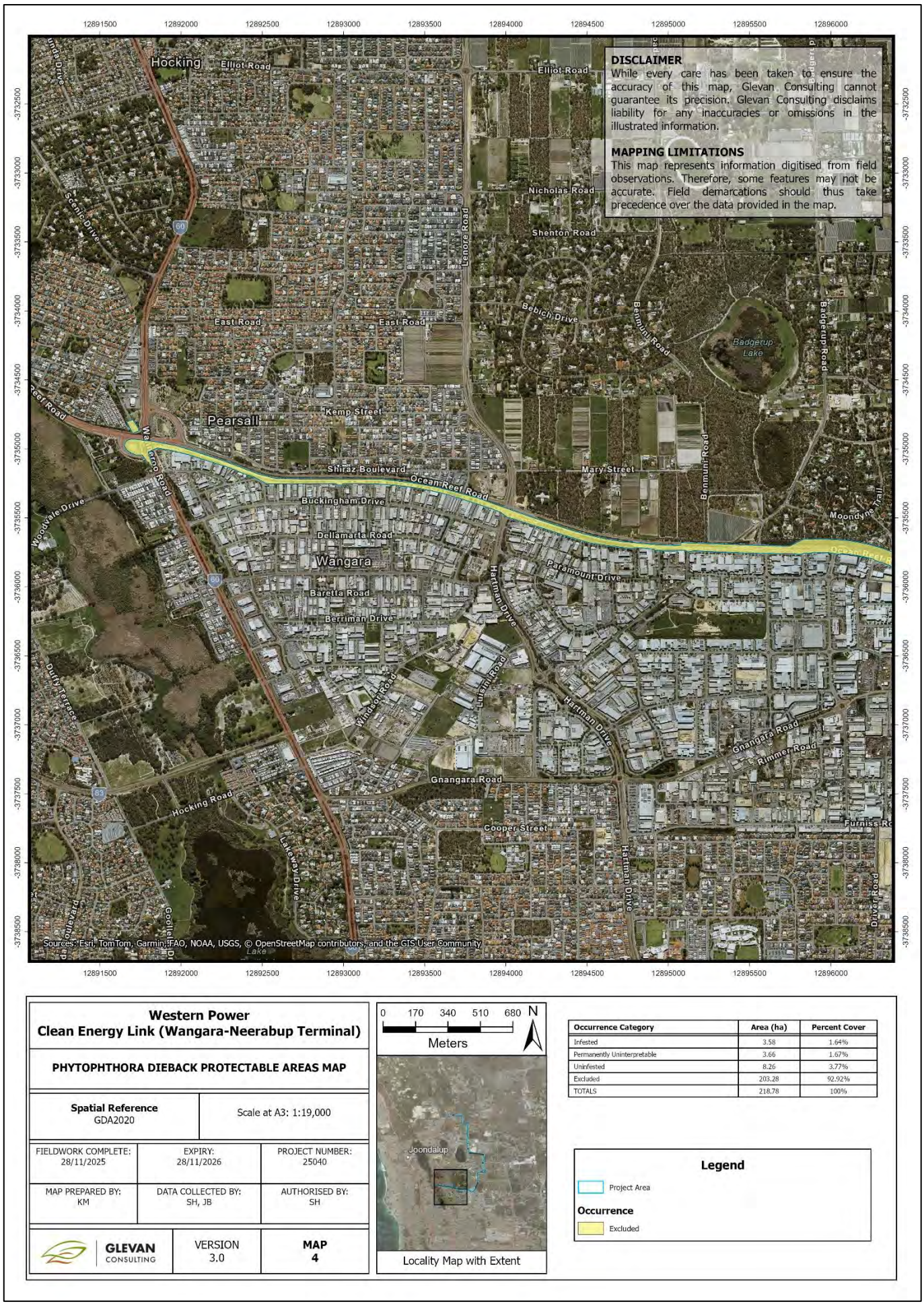

Figure 6 – Phytophthora Dieback Protectable Areas Map 4.

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