Appendix J

Dieback Management Plan

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Phytophthora Dieback Management Plan

Simcoa Moora Mine Site and North Kiaka Proposal

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Phytophthora Dieback Management Plan

Simcoa Mine Site and North Kiaka Proposal

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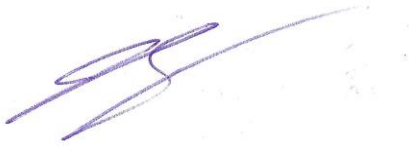

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EXECUTIVE SUMMARY

Simcoa produce silicon for national and international markets from the company facility in Kemerton near Bunbury. Quartzite used for the production of silicon is currently sourced from the Simcoa Moora Mine and a new mine area is currently proposed for North Kiaka (North Kiaka Proposal). These two sites occupy adjoining land, separated by Kiaka Road, to the north of the Moora townsite.

Current Phytophthora Dieback management practises applied across the existing Simcoa Moora Mine are defined in the Standard Operating Procedure (SoP) – Moora Mine Hygiene Measures. However the Department of Mines, Industry Regulation and Safety (DMIRS) have advised that a Phytophthora Dieback survey of the proposal area will be required, together with Phytophthora Dieback management strategies. It is also assumed that similar requirements may be applied to the existing Simcoa Moora Mine.

In response to the DMIRS requirement, a survey was undertaken using a survey methodology referred to as Broad Area survey. Results of the Broad Area survey were used to determine the requirement for a detailed disease occurrence survey and associated Phytophthora Dieback Management Plan (PDMP).

In Western Australia, assessment and management of Phytophthora Dieback is overseen by the DBCA. The DBCA's primary tools for the management of Phytophthora Dieback include the *Phytophthora Dieback Interpreters Manual for lands managed by the Department* (DBCA 2015) and the *Phytophthora Dieback Management Manual* (DBCA 2020). These are applicable to an area termed the Vulnerable zone which is defined as all areas receiving greater than 600 mm of annual rain fall and areas of lower rainfall where natural or manmade features such as creek lines, drains and soaks collect water, i.e., where water gaining sites occur.

The average annual rainfall across Simcoa's existing and proposed mine areas is approximately 460 mm (BoM 2022) which places the site in the Vulnerable Zone but suggests that infestations are most likely to be limited to creek lines and gullies or other water gaining features. During the current assessment it was noted that most of the remnant native vegetation occurs along the elevated quartzite ridge that lies along the eastern side of Study Area. Separating high points along the ridge are gently sloping alluvial valleys that do not represent defined creek lines or any other features that may be considered water gaining sites.

The only vegetation within the Study Area that was considered to be within the Vulnerable Zone occurs in the western area, surrounding the Moora Mine Site administrative facility. All other areas of remnant vegetation are therefore not subject the requirement for Phytophthora Dieback management as they are not at threat from the plant pathogen.

The vegetation within the Vulnerable Zone was classified as Uninterpretable due to an absence of susceptible species. It has been further classified as unprotectable as it receives direct runoff from the Midlands Road which is an uncontrollable disease vector. Therefore, there are no areas of protectable vegetation occurring across the Simcoa site and there is no requirement for a Phytophthora Dieback Management Plan. Ongoing operations should continue under the direction of the existing SoP which addresses the requirement of basic Phytophthora Management and is considered suitable for the sites.

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1 INTRODUCTION

1.1 Background

Simcoa produce silicon for national and international markets from the company facility in Kemerton near Bunbury. Quartzite used for the production of silicon is currently sourced from the Simcoa Moora Mine and a new mine area is currently proposed for North Kiaka (North Kiaka Proposal). These two sites occupy adjoining land, separated by Kiaka Road, to the north of the Moora townsite.

The North Kiaka Proposal has been referred to the EPA for assessment and a Mine Closure Plan (MCP) has been provided to the Department of Mines, Industry Regulation and Safety (DMIRS). DMIRS have advised that a Phytophthora Dieback survey of the proposal area will be required, together with Phytophthora Dieback management strategies. It is also assumed that similar requirements may be applied to the existing Simcoa Moora Mine.

Phytophthora Dieback is an introduced soil borne plant pathogen that affects up to 40% of native plant species within Western Australia. Most commonly the disease is caused by *Phytophthora cinnamomi,* however, other introduced species such as *P. multivora* can also have significant impact under specific environmental conditions.

Phytophthora Dieback is commonly introduced to an area through infested soils carried as basic raw materials or on vehicles, plant and machinery, or by humans on foot. In favourable conditions for the pathogen, infestation can result in the collapse of entire vegetation communities. Once introduced to an area, Phytophthora Dieback will spread through further human vectoring and also via water movement and root to root contact, resulting in extensive infestations which may cause significant impact to native vegetation communities. There is currently no practical method of eradication of the pathogen.

1.2 Objectives

The objectives of this 2022 Phytophthora Dieback Management Plan (PDMP) are to:

- assess remnant vegetation across the existing and proposed mine areas to determine the current Phytophthora Dieback occurrence.
- determine the protectability of remnant vegetation across the existing and proposed mine areas to identify vegetation that requires protection from Phytophthora Dieback introduction and/or spread.
- develop site specific management controls to reduce the spread of Phytophthora Dieback within the site.

The aim of this Phytophthora Dieback Management Plan is to mitigate the potential impacts of Phytophthora Dieback on native vegetation within the Simcoa Moora Mine and North Kiaka Proposal (the Study Area) with consideration for operational requirements.

1.3 Scope of Works

The scope of works performed to achieve the PDMP objectives included:

- Desktop assessment of the Simcoa Moora Mine and North Kiaka Proposal footprints including review of all available historic disease occurrence data and assessment of the sites' vulnerability to disease.

- Broad Area survey across vegetated areas within the existing and proposed mine areas to identify assessable vegetation, susceptible vegetation and evidence of Phytophthora Dieback within the vegetation.
- collection of field data using a hand-held GPS unit. Field data included survey effort track files, disease evidence points, soil and tissue sample locations and mapped disease boundaries.
- development of this PDMP inclusive of current (2022) Broad Area disease occurrence data and recommendations for ongoing hygiene; and
- development and supply of associated spatial data with reference to the EPA Index of Biodiversity Surveys for Assessments (IBSA) requirements (note there is no IBSA template for Dieback assessment data and the IBSA template for *1_Survey details* has been adapted).

The Broad Area survey method is defined in *Phytophthora Dieback Interpreters Manual for Land managed by the department* (DBCA, 2015). Broad Area survey data provides planning and management information only. Comprehensive Survey is required for operational purposes.

1.4 Site Characteristics

Simcoa's operations subject to the Phytophthora Dieback assessment and this PDMP include the existing Simcoa Moora Mine and the North Kiaka Proposal which occupy adjoining properties situated north and south of Kiaka Road. The two sites are located approximately 15 km north of the Moora townsite.

The North Kiaka Proposal is approximately 1.5-2 km NNE of the existing Simcoa Moora Mine. The North Kiaka Proposal is expected to generate up to 130,000 tpa of lump quartz for downstream processing at the Kemerton Silicon Smelter located in the Kemerton Strategic Industrial Area 17 km north-east of Bunbury, Western Australia. The North Kiaka Proposal will be open-cut and above the water table and has a predicted Life of Mine of 18 years based on current resource estimates.

2 PHYTOPHTHORA DIEBACK REGULATION AND MANAGEMENT

2.1 Legislative Framework

The biodiversity conservation provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) includes policy prepared under the Act in relation to species, habitat and protected areas. The EPBC Act lists Phytophthora Dieback as a key threatening process that poses a significant threat to biodiversity values within Australia. Policy prepared under the EPBC Act includes the national *Threat Abatement Plan for disease in natural ecosystems caused by Phytophthora cinnamomi* (TAP) (Commonwealth of Australia (CoA) 2018), and recovery plans for threatened flora species and communities that include Dieback management considerations.

The TAP (CoA 2018) establishes a national framework to guide and coordinate Australia's response to Phytophthora Dieback. This identifies research, management and other actions to mitigate impact of the pathogen to natural values.

In Western Australia, Phytophthora Dieback management is regulated by the Department of Biodiversity Conservation and Attractions (DBCA) through implementation of the *Biodiversity Conservation Act* (2016) and the *Conservation and Land Management Act* (1984). The DBCA also has certain statutory obligations under the *Biosecurity and Agriculture Management Act* (2007) concerning biosecurity matters generally, including *Phytophthora* spp. assessment and management.

2.2 Current Western Australian Management

In Western Australia, assessment and management of Phytophthora Dieback is overseen by the DBCA who regulate standards, implementation of hygiene and maintain a registration system for appropriately qualified Phytophthora Dieback Interpreters. The DBCA's primary tools for the management of Phytophthora Dieback in Western Australia include the *Phytophthora Dieback Interpreters Manual for lands managed by the Department* (DBCA 2015) and the *Phytophthora Dieback Management Manual* (DBCA 2020).

The Dieback Working Group, composed of State agencies, local government authorities and community groups, also contribute to Phytophthora Dieback management in Western Australia through the development and distribution of management guidelines for community and industry groups. *Standard Dieback Signage - protocols for use* (Project Dieback, 2008) guides standardised signage across tenures to raise awareness and mitigate disease spread.

2.2.1 Phytophthora Dieback Assessment

The *Phytophthora Dieback Interpreters Manual for Lands managed by the Department* (DBCA 2015) presents defined Phytophthora Dieback assessment methodologies. It identifies several assessment methods that provide for either linear or non-linear assessment. Assessment methods may vary depending on the project type, disturbance activity and objectives of the assessment.

While this document refers to lands managed by the DBCA, it is recognised in Western Australia as Industry best practice and is routinely applied across State, local government, and private estate.

DBCA (2015) guidelines identify six potential disease hygiene categories based on presence/absence of the disease, or the unknown disease status of an area. An area can have an unknown disease status if

the vegetation at the site is not susceptible to the disease or it cannot be assessed because of disturbance, e.g., fire. As a result, even if the pathogen is present, there may be no interpretable signs.

Only areas with suitable remnant native vegetation can be assessed. Areas that have been cleared or significantly altered are excluded from survey. In some cases, small, excluded areas may be afforded a hygiene category if they are small enough to be influenced by adjacent surveyed vegetation or situated such that topographical influences can be used to determine disease presence or absence.

The six possible disease categories are listed and described below:

1. **Infested –** Areas a registered interpreter determines to have plant disease symptoms consistent with the presence of *Phytophthora cinnamomi*.
2. **Uninfested –** Areas determined by a registered interpreter to be free of plant disease symptoms that indicate the presence of *P. cinnamomi*.
3. **Uninterpretable –** Natural, undisturbed areas where susceptible plants are absent, or are too few to make a determination of the presence or absence of *P. cinnamomi*.
4. **Temporarily uninterpretable –** Areas where disease presence or absence cannot be determined due to a level and type of site disturbance that will recover within the short to medium term, e.g., fire, rehabilitation.
5. **Not yet resolved –** *Phytophthora* occurrence diagnosis cannot be made because of inconsistent or incomplete evidence (including sample results). The category is only to be used in low interpretability zones (400 mm to 600 mm rainfall range).
6. **Disease risk roads (DRR) –** Interpreters will use the DRR category to show the disease status is unknown because of suspected or apparent recent use under unknown hygiene conditions.

Following the determination of disease categories, protectable areas are identified to determine areas that are likely to remain free from the disease with the application of appropriate disease hygiene as required.

Protectable areas are defined in the *Phytophthora Dieback Management Manual* (2020) as being areas that are likely to be classified Uninfested but may also include areas that are Uninterpretable. Protectable areas may also include areas of high conservation and/or socioeconomic value (e.g., a small uninfested area which contains a known population of a susceptible species of threatened flora) and which fall within the Vulnerable Zone. The protectable area criteria include areas that:

- are situated in zones receiving greater than 600 mm per annum average rainfall, or in lower rainfall zones in areas that are water gaining (e.g., granite outcrops, impeded drainage or engineering works which aggregate rainfall)
- are determined to be free of Dieback by a registered Phytophthora Dieback Interpreter (Uninterpretable areas may be classified as protectable) and
- are positioned in the landscape and of sufficient size (greater than four ha with a minimum axis greater than 100 m) such that an Interpreter judges that Phytophthora Dieback will not autonomously infest it, in the short term (a period of up to several decades).

2.3 Phytophthora Dieback Management across the Simcoa Moora Mine

Current Phytophthora Dieback management practises applied across the existing Simcoa Moora Mine are defined in the *Standard Operating Procedure (SoP) – Moora Mine Hygiene Measures.*

The SoP defines the hygiene measures applicable to all vehicles that have the potential to introduce weed species and disease at the mine. The aim is to ensure that adequate measures are taken to minimise the introduction of weeds and *Phytophthora* spp. and their impact on vegetation of high conservation value, particularly the Coomberdale Chert Threatened Ecological Community (TEC), which occurs across the site.

Hygiene management focuses on the principle of “Clean on Entry” to occurrences of the TEC or rehabilitation areas. Therefore, all vehicles, plant and machinery must be clean of soil and vegetative matter prior to entering any areas near rehabilitation zones or haul roads near areas of native vegetation on the Simcoa Moora Mine site.

3 ASSESSMENT METHOD

In accordance with the agreed project scope of works, the field survey was undertaken using a survey methodology referred to as Broad Area survey. The Broad Area survey method is consistent with the DBCA guideline, *Phytophthora Dieback Interpreters Manual for Lands managed by the Department* (2015). The information produced using this method of survey provides planning level disease hygiene information for application across all assessable vegetation within the existing Simcoa Moora Mine and North Kiaka Proposal mining areas (the Study Area).

Due to the mobility of the disease though autonomous spread and human vectoring, all disease occurrence data has a limited life of 12 months. A summary of key survey activities performed across the Simcoa existing and proposed mine areas is provided below.

3.1 Desktop Interpretation

Both existing and proposed mine areas were subject to an initial desktop assessment involving a review of available reports including flora and vegetation reports, geotechnical reports, known disease occurrence data including the Vegetation Health Service (VHS) *Phytophthora* sample database and an examination of available aerial imagery to assess:

- the extent of assessable remnant native vegetation occurring within the existing and proposed mine areas;
- the known occurrence of Phytophthora Dieback within or influential to the existing and proposed mine areas;
- the occurrence of site specific or influential high risk disease vectors including but not limited to roads, creek lines and gravel pits; and
- evidence of existing disease signatures such as areas of obvious vegetation decline.

3.2 Field Survey

The Broad Area survey method involved assessment of linear disease occurrence along accessible tracks and other linear infrastructure, with an extrapolation of disease occurrence using topography, high-risk disease vectors and other influences. It should be noted that extrapolated areas were not subject to intensive ground coverage, but all large, vegetated areas were traversed on foot and small areas were visually assessed from elevated vantage points.

The current assessment was undertaken in July 2022 by a DBCA registered disease interpreter and included visual diagnosis of the disease within areas of assessable remnant vegetation within the Study Area. Visual diagnosis involves identification of susceptible species' deaths occurring in patterns consistent with disease spread, such as radiating from an identified vector. Plant deaths associated with *Phytophthora* are rapid and complete rather than partial. Further, the disease presents a chronologic pattern of deaths, with the oldest deaths closest to the disease vector and most recent deaths further from the vector, forming a disease front.

Following the visual diagnosis of the disease, infested areas, if identified, are mapped along roads, tracks and other high risk disease vectors, while small infestations may be mapped in their entirety. Areas of vegetation considered to be uninfested or uninterpretable are not classified, as small undetected infestations may occur within them but remain undetectable due to the reduced survey effort associated

with this method of survey. For management purposes these areas should be considered protectable from future introduction or spread of the disease.

This method may only be used for non-operational mapping to identify obvious infested sites. It is usually carried out in very large areas where a comprehensive assessment would be prohibitively expensive and there are no soil disturbance activities anticipated within 12 months. The resulting data is generally used for broadscale planning and targeting of areas for comprehensive assessment, if required.

Field data including disease presence and vegetation information was collected using a hand-held GPS unit and converted to ArcGIS™ shapefiles. Collected field data included all sample locations, a point file of all identified individual plant deaths attributed to *Phytophthora*, disease hygiene boundaries and track files of the area covered during survey.

3.2.1 Sampling Program

Sampling for Phytophthora Dieback includes the collection of soil and tissue samples from fresh deaths of plants considered to be reliable indicator species of *Phytophthora* expression. The samples are labelled and placed into heavy duty plastic bags before being forwarded to the DBCA Vegetation Health Service (VHS) laboratory for analysis.

4 PHYTOPTHORA DIEBACK OCCURRENCE SURVEY RESULTS

The Regional location of the Simcoa Moora Mine and North Kiaka Proposal areas is shown in Figure 1. Figures 2-1 and 2-2 show the assessable vegetation and survey results from the Study Area

4.1 Desktop

4.1.1 Vegetation

Vegetation across the Study Area has been subject to several flora and vegetation surveys and nine separate vegetation alliances have been identified (Trudgen 2012). The native vegetation within the Study Area includes several occurrences of the conservation significant Threatened Ecological Community (TEC) "*Heath dominated by one or more Regelia megacephala, Kunzea praestans and Allocasuarina campestris on ridges and slopes of the chert hills of the Coomberdale Floristic Region*" (DPaW 2013).

From the report by Trudgen (2012), nine vegetation alliances have been identified across the Study Area. These include:

- *Allocasuarina campestris* high shrublands to open and closed scrub
- *Allocasuarina microstachya* open scrub
- *Regelia megacephala* high shrubland to open and closed scrub
- *Kunzea praestans* high shrubland to open and closed scrub
- *Melaleuca calyptroides* open to closed heath
- *Hibbertia subvaginata* low shrublands to low open heath
- *Xanthorrhoea drummondii* shrubland
- *Eucalyptus eudesmioides* mallee
- *Allocasuarina huegeliana* woodlands
- *Acacia acuminata* low woodlands

Trugden (2012), defines vegetation condition as being variable, ranging from excellent to poor with the majority being in Good or better condition. Trugden (2018) assessed vegetation condition across the North Kiaka Proposal area and defines vegetation condition ranging from Completely Degraded to Very Good.

Individual species listed in the available flora and vegetation reports identify the following species that are considered to be likely disease indicator species due to known susceptibility of these plant genera to *Phytophthora* species.

- *Banksia fraseri var. fraseri.*
- *Banksia sessilis.*
- *Xanthorrhoea drummondii.*

4.1.2 Assessable remnant native vegetation

As defined in the assessment criteria presented in Section 3, only areas with suitable remnant native vegetation can be assessed. Areas that have been cleared or significantly altered are excluded from

assessment (i.e., those classed as degraded or completely degraded under the Keighery (1994) condition scale).

A review of available aerial imagery identified potentially assessable vegetation occurring along the eastern side of the Simcoa Moora Mine with a small area surrounding the site office and associated infrastructure on the western side of the mine. Potentially assessable vegetation within the North Kiaka Proposal area occurs in defined pockets across the area, predominantly in the central and eastern portions of the site. A small area of potentially assessable vegetation occurs in the southwest of the proposed mine area. Aerial imagery also shows significant areas of vegetation in the northern section, however, these present as degraded and potentially un-assessable due to vegetation condition.

4.1.3 Geology

As described in the North Kiaka Approvals and Supporting Studies Geotechnical Desktop Study (GHD, 2021) the Study Area is underlain by Noondine Chert, which outcrops in NNW-SSE trending parallel ridges. Between the ridges are gentle sloping valleys infilled with Colluvium at the margins and Alluvium elsewhere. Historical investigations are limited to the ridges and no information is available regarding the depth of valley soils. Where valleys are narrow and aligned parallel/perpendicular with ridges, they may represent preferentially weathered Dolerite Dykes.

4.1.4 Previous interpretation data

There were no previous Phytophthora Dieback assessment reports associated with the Simcoa existing and proposed mine areas available for review. A review of the VHS positive sample database shows that nearest known occurrence of *Phytophthora* occurs approximately 50 km to the west. These known locations do not influence the Study Area.

4.1.5 Land Use

Both sites are in the Moora Shire that is situated in the Western Australian Wheatbelt region. The region has been extensively cleared for agriculture which is the main land use that has influenced both sites. The existing Simcoa Moora Mine has also been subject to extensive excavation associated with the quarrying activities at the site.

There is limited public access to both sites and all remnant vegetation across the Simcoa Moora Mine is separated from mining activities by exclusion fencing.

4.1.6 Climate

The Bureau of Meteorology (BoM) broadly classifies the climate across the southwest region of Western Australia as warm summers with cold winters. The BoM maintains a network of weather stations across Australia to record weather data. The nearest stations to the project area with detailed annual average data include Berkshire Valley, Walebing, Barberton and Lupin Valley. The long-term average annual rainfall data from across these sites shows that annual average rainfall ranges between 429.0 mm at Berkshire Valley through to 500.5 mm at Lupin Valley (BoM 2022). The Study Area is situated roughly central to these sites and so average annual rainfall across the Study Area is likely to be around 460 mm.

The closest BoM weather station recording temperature data is located at Walebing. Records from this station show that the highest average maximum temperature is 33.9 °C in January while the lowest average minimum temperature is 16.1 °C in July (BoM 2022).

These are important figures as the accepted distribution of *Phytophthora* is generally restricted by the 400 mm isohyet with distribution in the 400 - 600 mm/yr zone further restricted to sites with high summer rainfall averages or associated with water gaining sites. Based on the BoM climate classification and rainfall data the Study Area experiences suitable climatic conditions for *Phytophthora* to have an impact, however, due to high summer temperatures and some years experiencing marginal rainfall it is unlikely that significant impact associated with Phytophthora Dieback will occur. This impact is also likely to be limited to creek lines, soaks and other water gaining sites.

4.2 Broad Area Survey Results

A summary of key statistics from the Broad Area survey is presented in Table 1 below:

Table 1: Summary of key statistics from the Simcoa Study Area

Simcoa Study Area – Summary of Key Statistics	
Area of Assessable Vegetation	164 ha
Infested Vegetation	0 ha
Uninterpretable Vegetation	149 ha
Uninfested Vegetation	15 ha

No visual evidence of Phytophthora Dieback was observed and no soil and tissue samples were collected.

No Protectable Areas were identified within the Study Area.

4.3 Broad Area Survey Discussion

4.3.1 Environmental Conditions required for Phytophthora Dieback to impact vegetation

The spread of Phytophthora Dieback is dependent upon environmental conditions (moisture and temperature) and host availability. The variability of these factors produces an extremely wide range of disease syndromes in Western Australian vegetation communities. It is known that the impact of the disease may be greater in the higher rainfall areas and the impact and distribution of infested areas is reduced in the lower rainfall zones.

As identified in Section 1.4.4 the DBCA (2015, 2020) define the Vulnerable Zone for susceptibility to Phytophthora Dieback as all areas in the south west with average annual rainfall above 400 mm. Disease occurrence in the Vulnerable Zone is further refined in the 400 mm to 600 mm rainfall zone, as suitable environmental conditions in this lower rainfall zone will occur where natural or manmade features such as creek lines, drains and soaks that collect water exist, i.e., where water gaining sites occur.

The average annual rainfall across Simcoa's existing and proposed mine areas is approximately 460 mm (BoM 2022) which places the site in the Vulnerable Zone but suggests that infestations are most likely to be limited to creek lines and gullies or other water gaining features. During the current assessment it was noted that most of the remnant native vegetation occurs along the elevated quartzite ridge that lies along the eastern side of Study Area. Separating high points along the ridge are gently sloping alluvial valleys that do not represent defined creek lines or any other features that may be considered water gaining sites.

Based on these observations and the rainfall zone, it is considered that Phytophthora Dieback will not impact vegetation systems occurring along the elevated quartzite ridgeline in the east of the Study Area.

Vegetation occurring along Midlands Road and within the creek system to the north of Kiaka Road is a Eucalyptus woodland that is not described in the reviewed flora and vegetation report. It includes remnant vegetation in the west of the existing Simcoa Moora Mine, surrounding the mine administration centre and also vegetation in the very southern extent of the North Kiaka Proposal area. This vegetation includes low lying areas and at the time of assessment appeared to be very wet. The vegetation unit is considered to be a water gaining site that would provide a suitable environmental for *Phytophthora* species, however, no susceptible species were present in this vegetation. The vegetation in the creek line north of Kiaka Road was excluded from survey as the vegetation condition was rated Degraded due to ongoing and historic grazing which has removed all understorey species.

4.3.2 Environmental Conditions required for Assessment

Interpretation of vegetation for Phytophthora Dieback occurrence requires there to be suitable soil moisture that will stimulate disease activity, resulting in visible disease expression. The current survey was undertaken in July 2022. This survey timing was preceded by the 2021 winter season where above average rainfall was received and average rainfall was recorded for the preceding months of May and June, 2022 (BoM 2022). Subsurface soil conditions at the time of survey were visibly moist. These conditions are considered to provide a suitable environment for disease expression to be visible at the time of assessment if Phytophthora Dieback is present across the Study Area.

4.3.3 Disease Hygiene Categories

Following the Broad Area survey of all assessable areas of remnant vegetation across the Study Area it was determined that the majority of the assessable vegetation is classified as Uninterpretable for Phytophthora Dieback. This is due to either the complete absence of susceptible species or limited numbers of susceptible species being present. In some small areas, susceptible species including *B. sessilis* and *X. drummondii* occurred in limited numbers. Some old dead individuals were noted, however, no old or fresh deaths that presented as consistent with Phytophthora Dieback impact were noted, suggesting that Phytophthora Dieback is absent from the vegetation.

There are three small areas of Uninfested vegetation that were identified in the northern portion of the North Kiaka Proposal area. These are showing significant impact from grazing but were in Good condition at the time of survey. Suitable numbers of healthy *B. sessilis* and *X. drummondii* occurred in these areas and there was no visual disease expression. These areas are considered to be outside the Vulnerable Zone as defined in the PDMM (DBCA 2020) as they receive less than 600 mm of annual rainfall and do not represent water gaining sites.

It is important to note that these disease hygiene categories have been determined from a Broad Area survey which does not produce disease occurrence data suitable for operational application. The small Uninfested areas were subject to a more intensive ground coverage and are believed to represent accurate disease occurrence data, however, limited ground coverage was applied to the Uninterpretable areas. It was possible to gain several suitable vantage points where observation of large areas of vegetation could be made, consistent with the vantage point survey method (DBCA 2015). From these vantage points it could be seen that all Uninterpretable vegetation along the eastern ridgeline was uniform in appearance, supporting the Uninterpretable classification.

4.3.4 Protectable area assessment

As presented in Section 3, the criteria for Protectable Areas as defined in the PDMM (DBCA 2020) requires Protectable Areas to occur in the Vulnerable Zone and meet other criteria.

All vegetation occurring along the eastern quartzite ridgeline is considered outside the Vulnerable Zone on the basis of having average annual rainfall that is below 600 mm and an absence of water gaining sites that may generate suitable conditions for Phytophthora Dieback to survive.

All vegetation in low lying areas surrounding the Simcoa Moora Mine administration facility in the west of the Study Area are Uninterpretable. . . While Uninterpretable areas may be classified Protectable, this area may receive potentially infested drainage from roadside drains along Midlands Road. As disease absence cannot be determined by a registered Phytophthora Dieback Interpreter due to the absence of susceptible species it must be classified as unprotectable. Therefore, no Phytophthora Dieback Protectable Areas have been assigned across the Study Area.

4.4 Limitation of survey results

Phytophthora Dieback is a soil borne plant pathogen that spreads autonomously via root to root transmission, independently through the soil and also with the movement of water. The disease is also widely spread by human activities involving the movement of infested soil and plant material. As a result, the edge of a disease infestation is considered to be an actively spreading disease front, and all uninfested areas of vegetation that are associated with human vectors such as tracks and access ways are considered to be at risk of future infestation unless appropriate management is applied.

The disease occurrence data presented in this report is representative of the distribution of Phytophthora Dieback within assessable vegetation across the Simcoa Moora Mine and North Kiaka Proposal area at the time of assessment. It does not represent high confidence operational scale data. In accordance with DBCA guidelines (2015, 2020), operational scale data is required prior to any planned soil disturbance activities. Operational scale data is developed from disease occurrence surveys undertaken using either the Comprehensive Transect or Linear surveys methods which are defined in the *Phytophthora Dieback Interpreters Manual for Lands managed by the Department* (DBCA, 2015)**.**

Operational scale Phytophthora Dieback occurrence data is valid for a period of 12 months from the date of assessment. After 12 months a disease re-check assessment is required and after three years a full re-assessment of the survey area will be required. As there are no Protectable Areas within the Study Area and the majority of the Study Area falls outside the Vulnerable Zone for Phytophthora, future re-check or re-assessment is not considered necessary.

5 PHYTOPHTHORA DIEBACK RISK ASSESSMENT

Application of the PDMM (DBCA, 2020) is intended for lands that occur within the Vulnerable Zone. The only vegetation within the Simcoa Moora Mine and North Kiaka Proposal area that occurs in the Vulnerable Zone is the woodland vegetation surrounding the Simcoa Moora Mine administration facility, situated along Midlands Road in the west of the Study Area.

The PDMM (DBCA 2020) requires proposed soil movement activities within the Vulnerable Zone to be subject to a risk assessment. The outcome of the risk assessment determines the need for a PDMP and assists to define the nature of Phytophthora Dieback mitigation strategies that are required. Any activity that has a Moderate or High Risk must be undertaken in accordance with a activity specific PDMP while activities determined to have a low risk may proceed using Basic Phytophthora Dieback Management procedures (defined in Section 5.2).

5.1 Disease Risk

The primary source of Phytophthora Dieback introduction and spread is through controllable or uncontrollable disease vectors. Controllable disease vectors include human movement of contaminated soil, water and vegetation carried on vehicles, machinery equipment and clothing, including footwear. Uncontrollable disease vectors include movement of infested soil on animals including feral pigs and by autonomous spread.

The risk of introducing and/or spreading Phytophthora Dieback is closely related to the soil moisture content at the time of the proposed activity, the nature of the activity and the consequence of introducing the disease on vegetation occurring in the area the activity is planned. These are further described below.

5.1.1 Soil Moisture

As Phytophthora Dieback spreads most readily in infested soil transported on vehicles, machinery, equipment and footwear, higher levels of soil moisture will increase the risk of disease spread as it increases the soil's capacity to adhere to these carriers. Soil moisture classifications are:

- **Dry** – where dust forms when exposed soil is disturbed.
- **Moist** – where soil is damp but does not stick to carriers.
- **Wet** – where soil and moisture combine so that soil sticks to carriers.

The amount of rainfall required to influence the classification of soil moisture varies with soil type and therefore must be regularly monitored throughout an activity. Soils across the Simcoa Moora Mine and North Kiaka Proposal area vary, but typically have a low clay content which will decrease the likelihood of soils adhering to carriers with moisture.

5.1.2 Activity Type

The likelihood of introducing or spreading Phytophthora Dieback is dependent on the availability of a source of inoculum and the nature of the activity. Variables that should be considered include the type of equipment used, area covered, access, need for imported materials, duration of activity and drainage from the activity area.

As the assessment of likelihood assumes implementation of basic Phytophthora Dieback management practices, we assume the source of Phytophthora Dieback that could be introduced or spread will originate from:

- a hygiene breach associated with poor hygiene clean down practice prior to clean entry into protected areas or
- an unknown infestation occurring within an area assessed as being protectable from the pathogen.

The assessment of likelihood must consider the potential for each activity to experience a hygiene breach and the possibility for an undetected infestation to occur within the activity area. The level of likelihood is therefore directly associated with:

- the number of vehicles, machines and equipment involved the activity
- the size of the area involved and
- the duration of the activity.

5.1.3 Consequence of introducing Phytophthora Dieback

The consequence of introducing Phytophthora Dieback is based on the predicted impact of the pathogen in a specific vegetation type. This will vary with position in the landscape, annual rainfall and soil types.

Table 2 below is from the PDMM (DBCA 2020) and presents the predicted impact ratings and associated consequence ratings as defined in the PDMM. While not represented in the DBCA table below, DBCA also have a consequence rating of Insignificant which is incorporated into risk assessment matrix tables presented below.

Table 2: Predicted impact rating, assessment scale and associated consequence rating

Assessment for the consequence of introducing Phytophthora Dieback		
Predicted Impact	Scale of Impact	Consequence Rating
Very High	> 50% overstorey will die	**Severe**
High	10% to 50% of overstorey will die	**Significant**
Moderate	< 10% of overstorey and high numbers of understorey will die	**Moderate**
Low	No overstorey and minimal understorey will die	**Minor**

As discussed in Section 5, occurrence of Phytophthora Dieback is limited by environmental conditions, especially rainfall. Due to the low average annual rainfall and the absence of water gaining sites across much of the area, the occurrence of Phytophthora Dieback across the Simcoa Moora Mine and North Kiaka Proposal areas is anticipated to be limited to the vegetation surrounding the Simcoa Moora Mine administration facility that has been classified as Uninterpretable and Unprotectable. Therefore, there are no protectable, susceptible communities within the Simcoa Moora Mine and North Kiaka Proposal areas and the consequence rating is Insignificant.

5.1.4 Calculation of Activity Risk

Tables 3 – 5 are from the PDMM (DBCA 2020) and provide a risk assessment matrix based on activity likelihood of introducing the pathogen and the consequence of introducing the pathogen for each soil moisture classification. If an activity is anticipated to occur over a range of soil moisture conditions then

the worst case scenario must be applied. Example:, a construction program spanning 6 months is likely to include periods of activity occurring in wet soil conditions and so the wet soil risk assessment table must be used to calculate activity risk.

Any activity that is considered to have a Moderate or High Risk rating is required to be subject to an activity specific PDMP using Phytophthora Dieback occurrence data developed through operational scale disease survey methods (DBCA 2015). The activity specific PDMP may require the implementation of a targeted comprehensive Phytophthora Dieback assessment of the activity site prior to activity to map the occurrence of the pathogen in the immediate vicinity and to identify site specific Clean on Entry (CoE) points. Completion of the activity specific PDMP and identification of CoE points will identify specific operational hygiene strategies designed to mitigate the risk of introducing Phytophthora Dieback to protectable areas. Clean on Entry is further defined in Section 5.2.

Low risk activities can proceed with the application of basic Phytophthora Dieback management principles which are defined in Section 5.2.

Table 3: risk matrix for activities performed in Dry Soil Conditions

	Phytophthora Dieback Risk Assessment for Activities in Dry Soil				
Likelihood	**Consequence**				
	Insignificant	Minor	Moderate	Significant	Severe
Very Likely	**Low**	**Moderate**	**High**	**High**	**High**
Likely	**Low**	**Moderate**	**Moderate**	**High**	**High**
Possible	**Low**	**Low**	**Moderate**	**Moderate**	**High**
Unlikely	**Low**	**Low**	**Low**	**Moderate**	**Moderate**
Very Unlikely	**Low**	**Low**	**Low**	**Low**	**Low**

Table 4: risk matrix for activities performed in Moist Soil Conditions

	Phytophthora Dieback Risk Assessment for Activities in Moist Soil				
Likelihood	**Consequence**				
	Insignificant	Minor	Moderate	Significant	Severe
Very Likely	**Low**	**High**	**High**	**High**	**High**
Likely	**Low**	**Moderate**	**High**	**High**	**High**
Possible	**Low**	**Moderate**	**Moderate**	**High**	**High**
Unlikely	**Low**	**Low**	**Low**	**Moderate**	**High**
Very Unlikely	**Low**	**Low**	**Low**	**Moderate**	**Moderate**

Table 5: risk matrix for activities performed in Wet Soil Conditions

	Phytophthora Dieback Risk Assessment for Activities in Wet Soil				
Likelihood	**Consequence**				
	Insignificant	Minor	Moderate	Significant	Severe
Very Likely	**Low**	**High**	**High**	**High**	**High**
Likely	**Low**	**High**	**High**	**High**	**High**
Possible	**Low**	**Moderate**	**High**	**High**	**High**
Unlikely	**Low**	**Moderate**	**Moderate**	**High**	**High**
Very Unlikely	**Low**	**Low**	**Low**	**Moderate**	**Moderate**

NB: from Section 5.1.3, consequence rating for the Simcoa Moora Mine and North Kiaka Proposal areas is Insignificant. This results in a classification of Low risk for all soil moisture conditions.

In accordance with the PDMM, activities determined to have a Low risk do not require an activity specific PDMP and may proceed using Basic Phytophthora Dieback Management procedures.

5.2 Basic Phytophthora Dieback Management

Basic Phytophthora Dieback Management requires the standard of clean on entry (CoE) be applied across the Simcoa Moora Mine and North Kiaka Proposal areas. CoE is defined as the requirement for all vehicles, equipment, machinery and clothing including footwear to be clean and free from soil and or plant material prior to entering areas of remnant native vegetation. Basic Phytophthora Dieback Management practices include:

- no access to infested or unprotectable areas during moist or wet soil conditions.
- all personnel and site contractors to have completed Biosecurity awareness training. Basic Green Card training is a suitable standard of awareness training and is the requirement for operating on DBCA lands. A list of suitable Green Card training providers is available through the Dieback Working Group website.
- all external access points to remnant native vegetation on the Simcoa Moora Mine and North Kiaka Proposal areas are considered CoE points. All vehicles, equipment, machinery and clothing including footwear are to arrive at the Simcoa Moora Mine and North Kiaka Proposal areas in a hygienically clean state that is free from all soil and plant material.
- where practical, all activities undertaken in remnant vegetation should be performed during dry soil conditions.
- avoid driving through areas where Phytophthora Dieback may persist such as low-lying unprotectable areas, boggy creeks and puddles.
- carry mobile clean down kits (Commonwealth of Australia 2015) for minor, unplanned hygiene compliance.
- report any observed breaches of hygiene to the Supervising Manager.

6 REFERENCES

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Simcoa *Standard Operating Procedure (SoP) – Moora Mine Hygiene Measures.*

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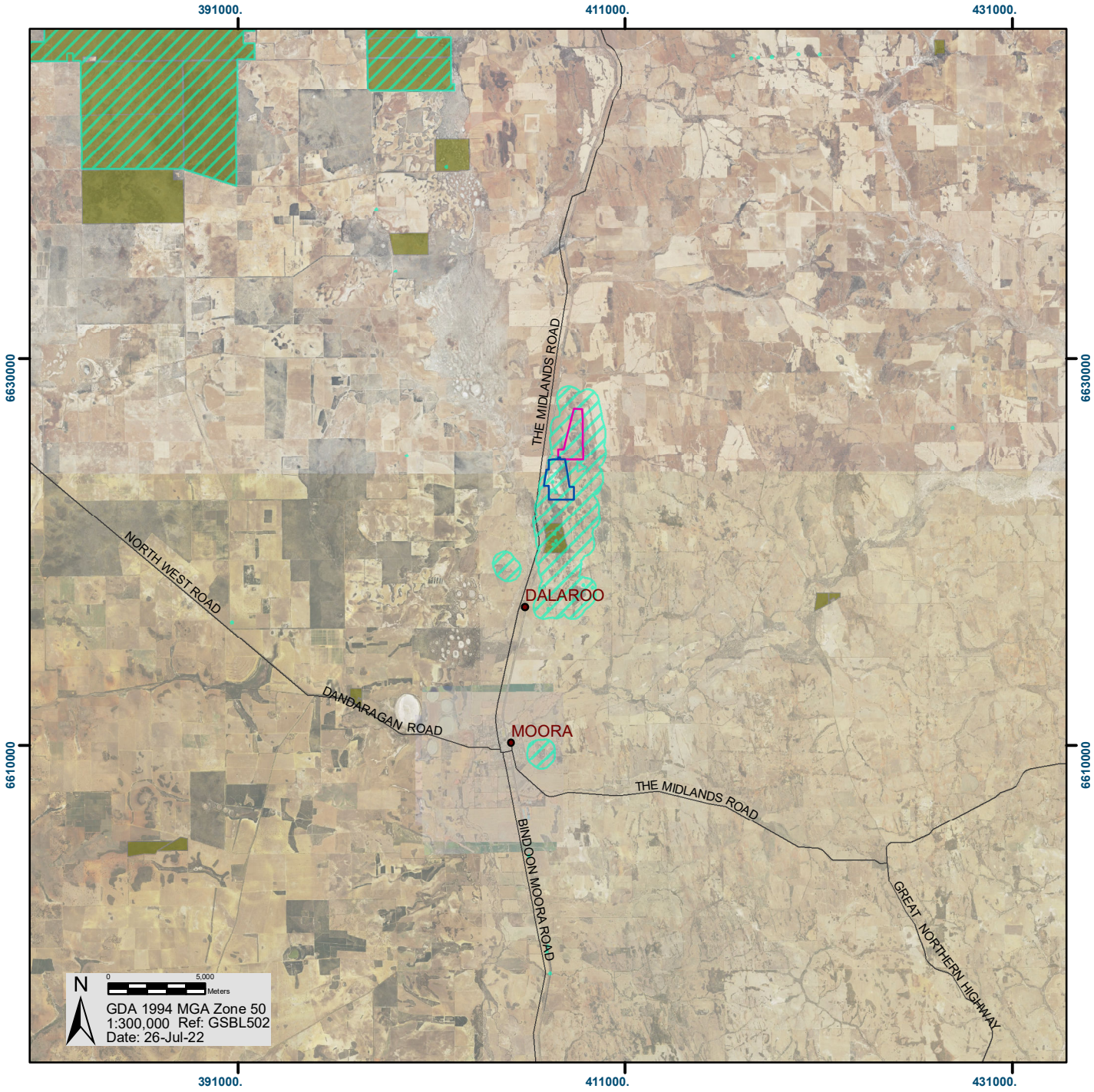
Figures

Phytophthora Dieback Occurrence Survey

Simcoa Moora Mine Site and North Kiaka Proposal

Figure 1 - Regional Location



- Simcoa Moora Mine Site
- North Kiaka Proposal
- DWER Environmentally Sensitive Areas
- DBCA Legislated Lands

Phytophthora Dieback Management Plan
Simcoa Moora Mine Site and North Kiaka Proposal
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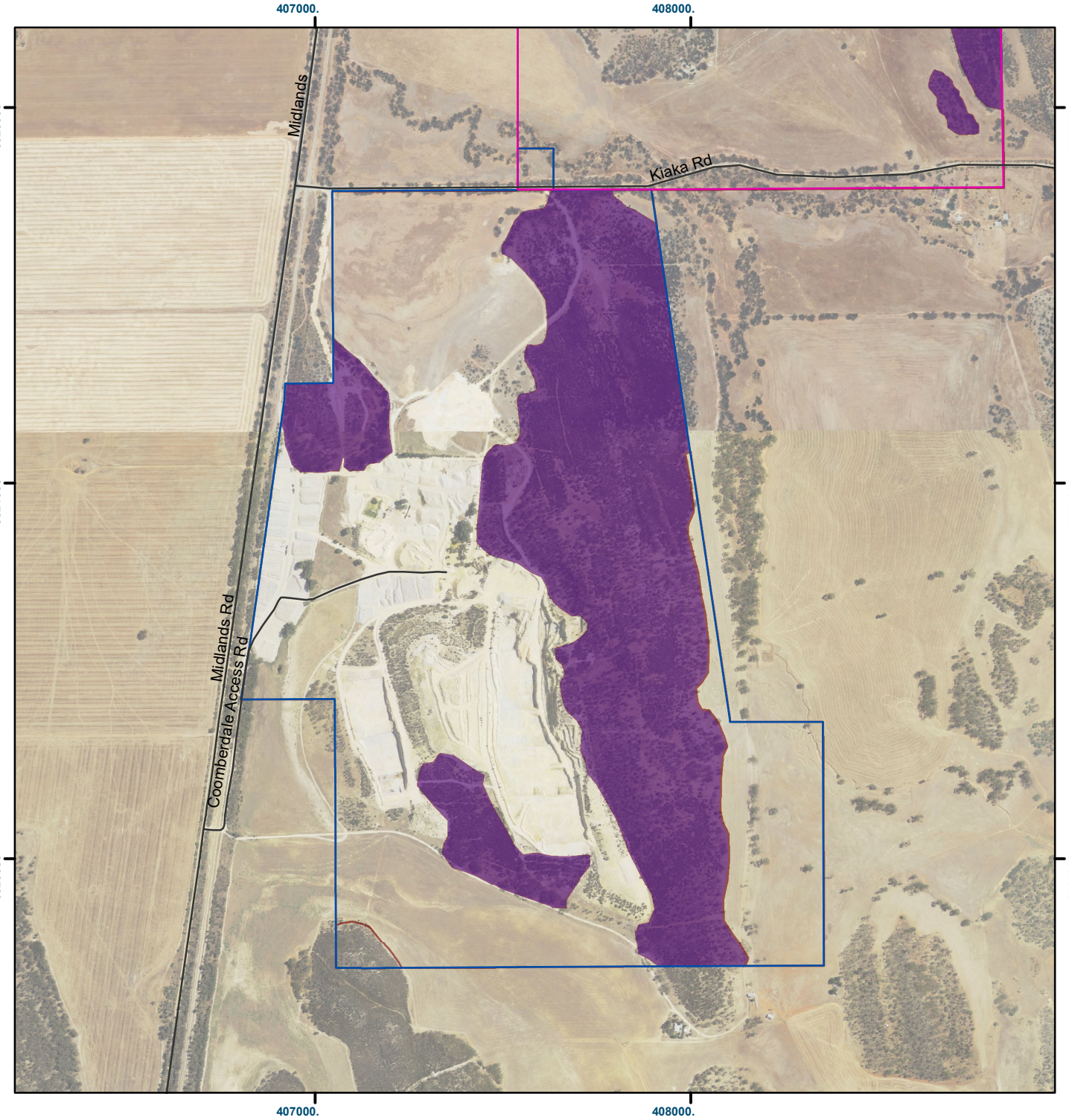
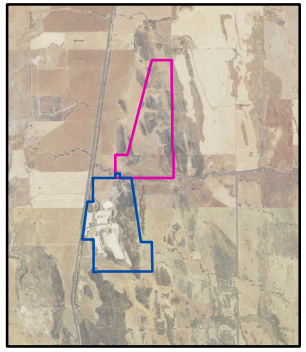


Figure 2-1 - Phytophthora Dieback Occurrence Survey - Simcoa Moora Mine Site

Phytophthora Dieback Status

- Uninfested
- Uninterpretable
- Excluded
- Simcoa Moora Mine Site
- North Kiaka Proposal



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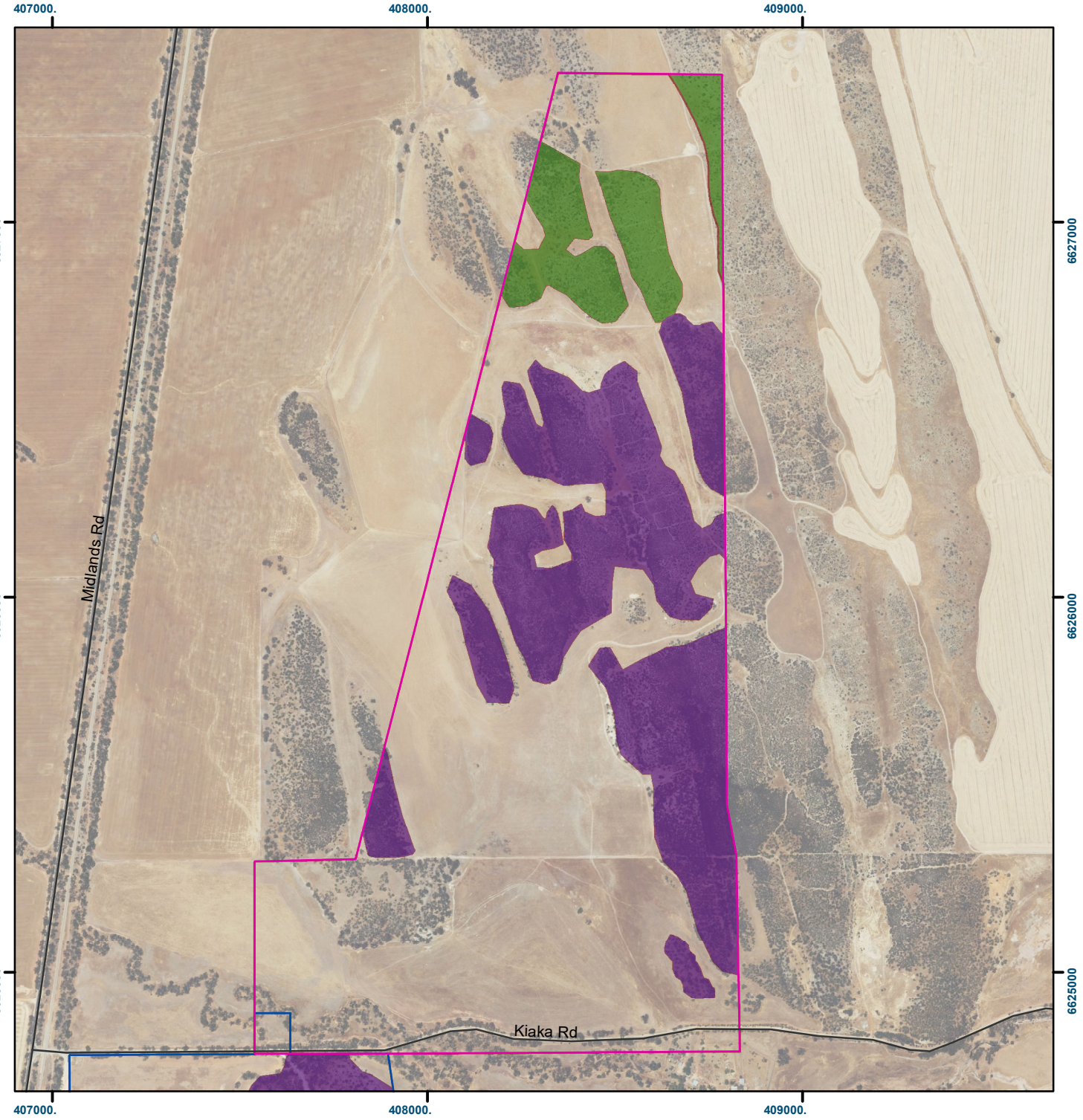
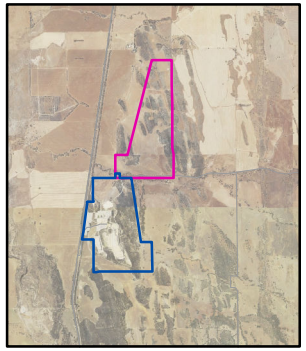


Figure 2-2 - Phytophthora Dieback Occurrence Survey - North Kiaka Proposal

Phytophthora Dieback Status

- Uninfested
- Uninterpretable
- Excluded
- Simcoa Moora Mine Site
- North Kiaka Proposal



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