

Phytophthora Management Plan

Emerald Hills Estate residential development, Leppington, New South Wales (EPBC 2013/6999)

Prepared for Macarthur Developments Pty Ltd

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1 Introduction

1.1 Project Background

Emerald Hills Estate (EHE) is a residential development within the Camden Council Local Government Area (LGA), in the southwest of the Greater Sydney region. The land is located immediately south of the South West Sydney Growth Centre Precinct of East Leppington and east of the Catherine Fields and Catherine Fields North Precincts. The site, incorporating both development and conservation areas, has an area of approximately 141 ha.

The overall development will be for residential landuse and is planned to consist of residential dwellings, associated infrastructure, parkland and open space, and environmental conservation (**Figure 1**).

The site has been predominantly cleared in the past for agricultural and other land uses. Due to the historic site usage, there were large areas of the site that had been cleared of remnant vegetation, with other consolidated areas of high quality stands of vegetation. The majority of the development areas are to be located in areas of cleared vegetation, having been previously used for rural and cattle grazing purposes. Remnant vegetation is comprised of stands of Alluvial Woodland and Shale Hills Woodland (Shale Hills Woodland is a component of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed critically endangered ecological community, Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest (CPW). The development footprint has an area of approximately 117.6 ha, which comprises 83.4% of the total site.

Eco Logical Australia (ELA) has prepared this Phytophthora Management Plan on behalf of Macarthur Developments Pty Ltd to outline measures to reduce the risk of *Phytophthora cinnamomi* entering the conservation area through development practices, and consequently to reduce the potential of any *Phytophthora* dieback (hereafter *P. cinnamomi* Dieback) on vegetation at the site. Movement of soil and water via vehicles and adjacent roads poses the most significant and rapid means of spreading or introducing Dieback into the protected vegetation within the site. As development progresses towards the perimeter of the conservation area, it becomes important to consider measures to reduce the potential for Dieback impacting the protected vegetation.

This Dieback Management Plan presents information on site-specific management techniques, and covers access, hygiene, signage, training, construction and maintenance, and dieback treatments.

This report has been prepared in compliance with condition 8 of the Emerald Hills Estate EPBC Act Approval which states:

To prevent the occurrence of dieback by Phytophthora cinnamomi on site and to mitigate potential impacts to the CPW to be retained win the Emerald Hills Estate Offset, the approval holder must ensure that appropriate hygiene measures are undertaken during construction, in accordance with the threat abatement plan (and associated background paper) for disease in natural ecosystems by Phytophthora cinnamomi.



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Figure 1: Development and Conservation Areas at EHE

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2 Background

2.1 Phytophthora cinnamomi

Phytophthora cinnamomi is a soil borne plant pathogen that attacks the roots of susceptible plants – destroying and reducing the ability of the plant to absorb water and nutrients. This causes symptoms referred to as 'Dieback' which can lead to plant death (Commonwealth of Australia 2015).

P. cinnamomi can spread through a site through soil, water and organic matter.

2.2 Key Threatening process

P. cinnamomi dieback is listed as a Key Threatening Process under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the EPBC Act. *P. cinnamomi* dieback can detroy entire patches of vegetation in a short period of time. The dramatic impact of *P. cinnamomi* infestations on plant communities may lead to major declines in some insect, bird and mammal species due to the loss of shelter, nesting sites and food sources.

2.3 On site conditions

P. cinnamomi is not known on site, and no visible evidence of Dieback of known susceptible species is apparent. The site is considered within the range of *P. cinnamomi* occurrence, as the pathogen thrives in warm, moist conditions with temperatures between 15°C and 30°C, and with rainfall greater than 400 millimetres a year. The pathogen has been recorded sporadically throughout the greater Sydney area as well as throughout the state.

³ Management Measures

3.1 Threats of spreading/ introducing Dieback

This section addresses specific construction activities carried out at the site and how each activity has the potential to spread or introduce *P. cinnamomi* Dieback.

Movement of soil and water via vehicles, machinery, equipment, and on footwear poses the most significant and rapid means of spreading or introducing *P. cinnamomi* (DWG 2008). Of particular significance is the grading of tracks and culverts, which has the potential to spread infested soil and vegetation into uninfested areas. Drainage culverts could potentially direct infested runoff into vegetated areas. Although infested soil and vegetation has not been recorded onsite, reducing the movement of soil and vegetation is still an effective measure to reduce the potential of spreading *P. cinnamomi*.

P. cinnamomi may also be introduced to the site by natural processes such as water and soil movement during period of rain and animal movement. Natural introductions cannot be prevented, but management actions can be implemented to minimise their impacts.

P. cinnamomi may remain dormant for long periods during dry weather and is impossible in most situations to eradicate from infested areas, which means limiting further spread is critical.

Information on site-specific management strategies is presented in this section, and should be read in conjunction with the Threat Abatement Plan (Commonwealth of Australia 2014).

3.1.1 Potential impacts of Dieback

The introduction and spread of Dieback throughout the site could impact upon the following:

- potential loss of protected conservation area consisting of Critically Endangered Ecological Community – Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (CPW)
- modification and/or loss of structure and composition of native plant communities, including CPW
- potential loss of flora species diversity which will be most notable with species susceptible to Dieback (i.e. Banksias and other members of the Proteaceae family)
- potential loss of threatened and other fauna through habitat loss or reduced habitat connectivity
- increased soil erosion and degradation of water quality following loss of vegetation.

3.2 Site activities

On-ground activities within the conservation area are relatively minimal at the site. Access is restricted into the conservation area, however, development construction works will be in close proximity to the boundary of the conservation area. **Table 1** addresses the construction activities with a high risk of introducing or spreading Dieback into the conservation area.

Activity type	Activity at the site	Means of Dieback introduction or spread
Construction and development	 cut and fill of site soils stockpiling clearing of top soils movement of site machinery, equipment and tools 	 planned soil movement sand or mud stuck to tools, equipment, vehicles and personnel (contaminated soil introduced to site) inappropriate storage of soil altered surface water flows
Demolition and decommissioning	demolition of existing site buildings	 planned soil movement sand or mud stuck to tools, equipment, vehicles and personnel inappropriate storage of soil
Maintenance	 cleaning of site equipment including general site vehicles and general equipment repair and maintenance of roads and fences biodiversity management (i.e. surveys and rehabilitation works in the conservation area) 	 planned soil movement off-road access Ssnd or mud stuck to tools, equipment, vehicles and personnel (contaminated soil introduced to site) altered surface water flows access into vegetation

Table 1: Summary	v of construction	activities with a	high risk of	introducing or	spreading Dieback
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3.3 **Non-construction activities**

On-ground non-construction activities are minimal at the site due to restricted access to construction workers only. Non-construction activities that pose a high risk of introducing or spreading Dieback to the site are presented in Table 2.

Γable 2: Summary of non-construction activities with a high risk of introducing or spreading Dieback			
Non-Defence activity	Means of Dieback introduction or spread		
Maintenance of utilities and associated infrastructure by contractors	 planned soil movement sand or mud stuck to tyres and underside of vehicles (contaminated soil introduced to site) sand or mud stuck to personnel's boots and clothing (contaminated soil introduced to site) altered surface water flows 		
Unauthorised access	 sand or mud stuck to people, tyres and underside of vehicles (contaminated soil introduced to site) access into vegetation 		
Native and introduced animal	access into vegetation		

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sand or mud stuck to animal's fur and paws / hooves

(contaminated soil introduced to site)

Table 2: Summary of non-o	construction activities	with a high risk of	introducing or	spreading Dieback
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movement

3.4 Site specific management techniques

This section provides site-specific management techniques that can be employed to reduce the likelihood of introduction and spread of Dieback throughout the site. These techniques are also likely to reduce the risk of introducing onto site other diseases and pathogens such as Myrtle Rust (*Puccinia psidii*). Management actions are shown in Table 3, with more detailed explanation described below.

3.4.1 Hygiene

All vehicles, machinery, equipment and boots should be free of mud, soil and vegetation prior to entering the site, particularly during wet weather. Due to temporary usage of the site for construction, the establishment of a vehicle wash down facility is not considered feasible. Alternatively, personnel and contractors should perform a visual inspection of all vehicles, machinery and equipment prior to entering and exiting the site. Construction workers should adopt the term "Arrive Clean, Leave Clean" (Commonwealth of Australia 2015) to promote Dieback hygiene management.

During wet weather, vehicles that may need to access the conservation area should be equipped with a biosecurity hygiene kit so that vehicles, footwear, tools and equipment can be cleaned before moving into the protected vegetation. A biosecurity hygiene kit should contain the following (Commonwealth of Australia 2015):

- plastic tub with a lid (to carry items and to use as a footbath)
- stiff brush
- newspaper to cover the foot well of vehicles (replace with clean newspaper regularly)
- dustpan and brush; possibly also a long-handled broom
- plastic bag for sweepings and dirty newspaper
- drum of water and sterilising solution, i.e.:
 - o solution of 70% ethanol/methylated spirits in 30% water
 - \circ $\,$ 20% household bleach (with 5% active ingredient) in 80% water $\,$
 - o quaternary ammonium disinfectant diluted according to manufacturer's directions
- spray bottle containing sterilising solution (as above)
- alcohol wipes or gel for hands and personal items.

Cleaning vehicles and machinery

Vehicles should be brushed/washed down on a hard, well-draining surface away from bushland. If soil and mud is dry, as much as possible should be removed with a stiff brush and any remaining/ wet soil should be washed off with a hose. All parts of the vehicle should be cleaned, including tyres and the undersides of vehicles. Care should be taken to ensure mud and wash down water does not drain into bushland (DWG 2008).

Cleaning boots and equipment

If entering any vegetated areas, dry soil and mud should be removed using a stiff brush, and collected in a plastic bag or bucket for disposal in a suitable location (i.e. away from vegetation, on a hard, welldraining surface or in appropriate refuse collection areas). Any remaining wet soil should be removed with a spray bottle containing a sterilising solution (see above for suitable sterilising solution options).

3.4.2 Access

Vehicle movement is likely to be the primary way of introducing and spreading Dieback within the site. Restricting access by members of the public into the site during construction is considered to be the highest priority to manage Dieback. Access should continue to be restricted to the public. In addition, the following access measures should be implemented:

- restrict access along tracks during wet weather
- do not permit the public to walk through the conservation area
- stay on existing tracks. Personnel should avoid walking through vegetated areas during wet weather
- new tracks should only be created if deemed essential (i.e. for fire suppression or vegetation rehabilitation activities)
- maintain fences and gates along site boundary.

3.4.3 Training

Dieback awareness training should be included in relevant inductions and Toolbox meetings to ensure all personnel and contractors entering the site are informed of the potential for Dieback entering site, the risk of spreading or introducing Dieback, and hygiene protocols which are to be adhered to at all times.

All workers to be provided with the "Arrive Clean, Leave Clean" guidelines (Commonwealth of Australia 2015).

3.4.4 Construction/ Maintenance

The biggest threat posed by construction and maintenance activities is the cut and fill activities, and grading or creation of new tracks, roads and drainage culverts.

Specifically, construction personnel and contractors should avoid moving soil and vegetation into areas nearby the conservation area. When maintaining or installing drainage culverts, ensure water is directed to the lowest possible point in the landscape and that surface water flows are directed away from the protected vegetation.

3.4.5 Rehabilitation

During any rehabilitation activities on-site, seeds, saplings and plants used for rehabilitating the conservation area should be sourced only from nurseries that are accredited under the Nursery Industry Accreditation Scheme Australia (NIASA). Soils, fertilisers and mulches should be obtained only from Dieback-free locations. Suppliers and more information is available from the Nursery and Garden Industry Australia 2013).

All personnel and contractors involved with rehabilitation works should have suitable Dieback awareness training and adhere to the site's hygiene and access requirements.

3.5 Inspections & Reporting

If *P. cinnamomi* is suspected to have entered the site, an ecologist should be notified immediately. The site environmental representative will organise testing of the soils and roots to validate the presence. Further management measures will be prescribed for the site if *P. cinnamomi* presence is confirmed.

Table 3: Management actions required for Development Areas

Management actions required	Development area
Construction works	Soil and sediment erosion control measures in place
Hygiene protocols - access	 Prior to entering development area: vehicle inspection and wash down if mud is present water and sediment from wash down is not to enter bushland
Training and education	All contractors to receive training regarding <i>P. cinnamomi</i> and be aware of all protocols to minimise risk of introduction of the pathogen All workers to be provided with the "Arrive Clean, Leave Clean" guidelines (Commonwealth of Australia 2015): http://www.environment.gov.au/system/files/resources/773abcad-39a8-469f-8d97-23e359576db6/files/arrive-clean-leave-clean.pdf
Revegetation	All plants used for landscaping purposes are to be sourced from nurseries which can verify their plants are free of <i>P. cinnamomi</i>

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