Environmental **C**onsulting **O**ptions **Tas**mania

WEED AND ROOT ROT FUNGUS (*Phytophthora cinnamomi*) MANAGEMENT PLAN FOR ZEEHAN ZINC LTD MINING LEASE AREAS, ZEEHAN, TASMANIA

Environmental Consulting Options Tasmania (ECO*tas*) for Zeehan Zinc Ltd

12 September 2007

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SUMMARY

Zeehan Zinc engaged ECOtas to record, map and report on any problem weed species in and near the Oceana and Comstock Mining Lease areas. Currently, the Comstock lease area is being mined and has an existing processing plant. It is proposed to open cut mine the Oceana lease and transport the material to the Comstock processing plant for refining.

Weed Species

Three species (gorse – *Ulex europaeus*, himalayan honeysuckle - *Leycesteria formosa*, and blackberry – *Rubus fruticosus* agg.) listed as a declared weeds on the *Weed Management Act 1999* were recorded from the Comstock and Oceana Mining Lease areas.

The Comstock area only has isolated occurrences of gorse associated with the Trial Harbour Road. The Oceana Mining Lease area has widespread occurrences of all three species covering a large area.

Plant Disease

The soil borne pathogen, root rot fungus (*Phytophthora cinnamomi*) was found to be present in soil samples collected at the Oceana Mining Lease area. The two positive samples were associated with the old mining tracks. Further sampling could find that the species is more widespread in the area. The samples from the Comstock Mining Lease area were negative.

Recommendations

The following recommendations are guidelines for the basic management of both of the mining lease areas. Further details are included in the following report. Note that the most critical recommendation is machinery and vehicle hygiene. This is due to the large areas of disturbance within the largely weed free Comstock Mining Lease and the very "weedy" Oceana Mining Lease.

General Recommendations

- Minimise high-risk activities in area (e.g. use of earth moving machinery or unnecessary clearing);
- Apply weed and *P. cinnamomi* hygiene prescriptions to manage high-risk activities (e.g. clearing new areas);
- Avoid as far as possible introduction of high-risk products to the area (e.g. gravel that has come from a quarry infected with *P. cinnamomi* or where weeds are present);
- Only introduce products that are screened as free of weeds and *P. cinnamomi* contamination into the area;
- Apply weed and *P. cinnamomi* hygiene prescriptions to all vehicle use in the area;
- Encourage good hygiene practices by users (e.g. staff and contractors);
- Manage vehicle access (e.g. by having only one access point to mine area).

Oceana Mining Lease

- Implement weed control measures immediately to contain the potential of further spread;
- Consider a machinery washdown point at the intersection of the Oceana Mine road and the Henty Road. This will ensure the risk of spreading weed and disease is minimised. Vehicles should be washed down as they enter the site as well as exiting the site (see section 3.1 for further information on machinery washdown).
- All topsoil which is contaminated with weed and disease species should be stockpiled and quarantined so that control measures and containment can be implemented. The water from

the stockpile should be diverted into a tailings dam/co-disposal area so that the risk of weed and disease spreading down waterways is minimised.

- Access to the site should be restricted to the one access point so that weed incursion can be minimised and all vehicles have to go through a washdown point.
- Staff and contractors should be aware of the weed and disease locations and should report any new incursions to the Zeehan Zinc Environmental Officer.
- Recreational walkers accessing Mt Zeehan should be made aware of the weed and disease problem and a walker washdown point for shoes should be made available at the start of the track. Furthermore, since the location of the positive root rot fungus samples is in the vicinity of the walking track, consideration should be given to diverting the track away from this area to reduce the risk of spread.

Comstock Mining Lease

- Implement weed control measures immediately to contain the potential of further spread.
- A vehicle washdown point should be considered at the main entrance to the Comstock mine. This would reduce the risk of weed and disease incursion to this currently weed free site (see section 3.1 for further information on machinery washdown).
- Access to the site should be restricted to one access point (the main entrance). This is effective in controlling weed incursion and clean machinery.
- All water should be contained within the Comstock Creek catchment. This will reduce the risk of root rot fungus from invading the weed and disease free vegetation surrounding the site. Little effort is required to achieve this goal as the existing topography contains the water to this catchment.
- The threatened plant *Epacris curtisiae* (northwest heath) location on the western side of the Trial Harbour Road should be considered as a special management zone. The zone should be advertised and staff/contractors made aware of the significance of the site and importance of hygiene. This is due to the susceptibility of the species to root rot fungus and the geographical importance of the population.

INTRODUCTION

Background

Zeehan Zinc Ltd currently has two mining lease areas: Comstock and Oceana (see Figure 1 for location of the lease areas). The Comstock mine is approximately 4 km west of the township of Zeehan on the Trial Harbour Road. This mine is currently under the mining leases 43M/1985, 19M/1995, 123M/1947 and 9M/2002 and has started operation (2007). The Oceana mining lease (2M/2005) is located approximately 3 km south of Zeehan on the Henty Road. Mining at the Oceana site is due to start in early 2008. Both of the mines are open cut extracting zinc, lead and silver. It is proposed to transport ore from the new Oceana mine area to the existing Comstock processing plant via the existing road network.

Both of the Comstock and Oceana mine areas have known distributions of weed species. Some management actions have taken place, but there has not been an integrated weed management strategy for the mine sites.

The Zeehan region has been the focus for weed management in the past due to the large infestations of the identified Weed of National Significance (WoNS), gorse (*Ulex europaeus*). Gorse has been subject to intensive management in recent years following the implementation of the *West Coast Weed and Fire Management Strategy* (2001). This strategy is based on input from key stakeholders in land management in the West Coast Council municipal area. The West Coast Weed and Fire Management Group (WCWFMG) has representatives from DIER, West Coast Council, Forestry Tasmania, Verdanta - Copper Mines Tasmania, Cradle Coast NRM, Parks and Wildlife Service, Hydro Tasmania, Transend Networks and input from all the local landcare groups and most of the mines on the West Coast.

Purpose

Due to several weed species occurring on the Zeehan Zinc mining lease areas, ECOtas was engaged to assess the distribution and potential distribution of weed species within and surrounding the Zeehan Zinc mining lease areas. The primary purpose of the assessment was to record the weed species present within the lease areas. In addition, sampling was conducted to determine if the pathogen, *Phytophthora cinnamomi* (root rot fungus) was present within the mining leases. Management options of the weed species and *Phytophthora* are presented.

This plan shall include:

- the location and type of each weed species that have been recorded during previous vegetation surveys;
- weed species that have not been recorded within the project area, but which have the potential to occur;
- recommendations related to weed control measures and/or monitoring activities to be used to minimise the potential for weed species that have not been previously recorded in the project area from entering the sites.

Relevant Legislation

State weed management legislation was developed in acknowledgement of the serious impacts of weeds and the need for a highly inclusive process to combat them. As the legislation is an important tool for directing the management of declared weeds in the region, a summary follows.

The *Weed Management Act 1999* (hereafter, the Act) replaced the *Noxious Weeds Act 1964* and now provides the legislative framework for weed management in Tasmania. The Act is administered by the Department of Primary Industries and Water (DPIW) and is used to take regulatory action in respect to three categories of plants:

- Category 1: plants that are not naturalised in Tasmania but that have the potential to become weeds, if allowed to enter and establish;
- Category 2: plants that are naturalised in Tasmania but in a limited fashion and that have the potential to spread much further and cause greater harm;
- Category 3: plants that are widespread, have demonstrable weed impacts and for which strategic control can be usefully undertaken.

Currently 77 species are listed as "declared weeds" under the Act. More than two thirds of these fall into the first two categories described above, demonstrating the high priority placed on preventative action. Weeds currently declared under the Act in the Cradle Coast Region are listed in Appendix 2, by municipality. The provisions of the Act that are applied to each plant are set out in *Statutory Weed Management Plans* (WMPs). Each plan specifies the requirements and prohibitions that relate to importation, sale and control requirements for each declared weed (information on declared weeds, including WMPs, is available from the DPIW website: www.dpiw.tas.gov.au).

Category 1 and 2 weeds are required to be eradicated wherever they occur in Tasmania. The control requirements for Category 3 weeds depend on their distribution status on a municipal basis. Municipalities in which Category 3 weeds are not widely distributed are called Zone A municipalities and the requirement is eradication. Municipalities in which the plant is widespread are called Zone B municipalities and the requirement is containment. This means the land manager must make efforts to prevent the plant escaping their properties/management areas. For example, West Coast Municipality is a Zone B municipality for gorse where containment is the most appropriate objective. The zoning status may change from time to time to reflect the status and extent of the weed species.

Qualifications

This report relates to:

- weed species of management significance, including a discussion of species present, and other species of management significance/interest;
- plant disease (*Phytophthora cinnamomi*) issues, including a discussion of the presence of the pathogen and management recommendations.

Except where otherwise stated, the opinions and interpretations of legislation and policy expressed in this report are made by the authors and do not necessarily reflect those of the relevant agency. The client should confirm management prescriptions with the relevant agency before acting on the content of this report.

METHODS

Study area

The study area considered both of the Zeehan Zinc mining leases (Oceana and Comstock) and the greater Zeehan area (Figure 1). The study concentrated on thoroughly recording all weed species on the mining lease areas. Furthermore, weed species recorded in the Zeehan region in the past were considered.

Nomenclature

All grid references in this report are in GDA94, except where otherwise stated. Vascular species nomenclature follows Buchanan (2005) for scientific names and Wapstra *et al*. (2005) for common names.

Preliminary investigation

Available sources of threatened flora and fauna records were interrogated. These sources include DPIW's *Natural Values Atlas* (Report No. 168880 ECOtas_July_120707) (DPIW 2007) and the Forest Practices Authority's online *Threatened Fauna Manual* (FPA 2007). Additional information sources were checked, as indicated in the text and tables below.

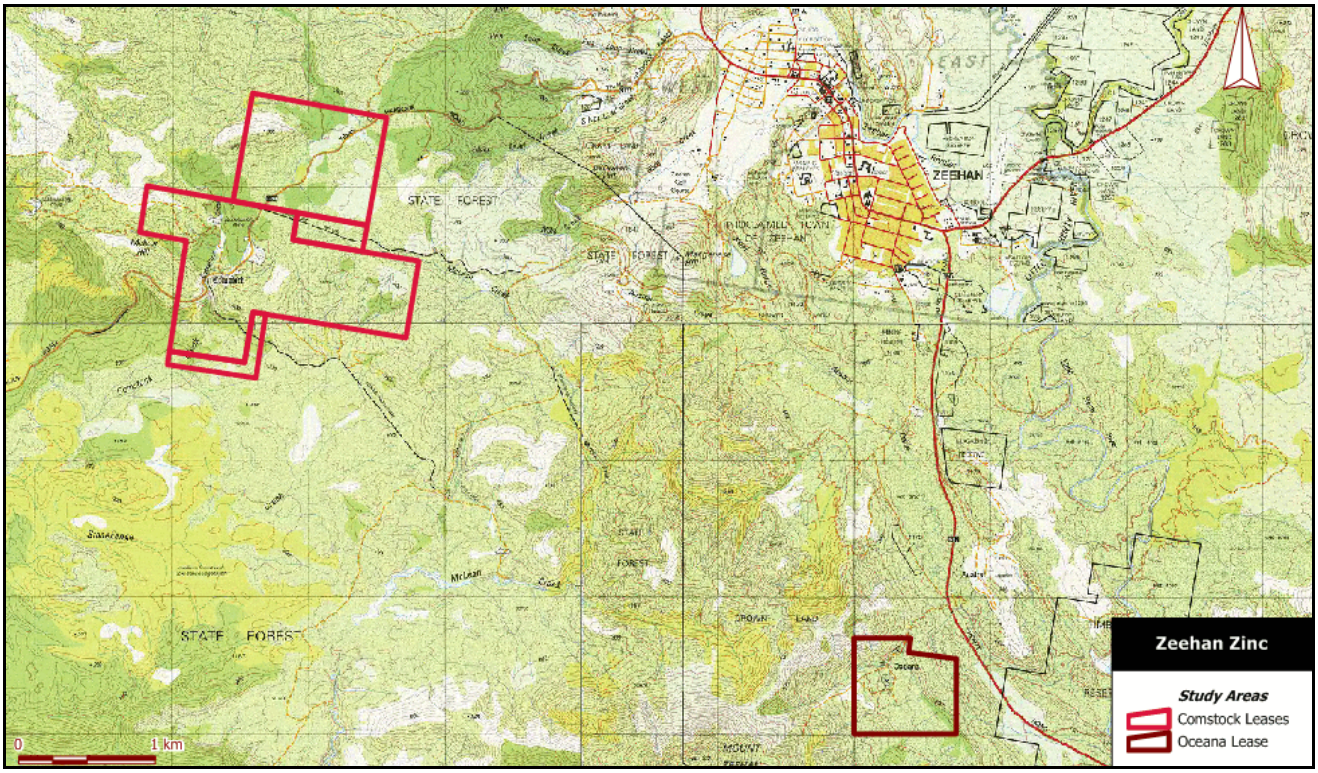

Figure 1. Map showing general location of the study area and mining lease locations.

Weed and root rot fungus survey

The assessment took place between 7-9 August 2007 and was undertaken by Brian French and Bec Dillon.

The survey aimed to map the distribution of listed weed species in the study areas and to sample for root rot fungus (*Phytophthora cinnamomi*) (see Figure 1). In this case, survey coverage was not limited by access restrictions because of numerous roads and tracks.

Reference to topographic maps (Trial-3435, Heemskirk–3436, Oceana-3635, Dundas-3636 TASMAP 1: 25000 scale) and aerial photography (rectified aerial imagery provided by Zeehan Zinc) established the approximate range and distribution of topographic and potential weed locations present in the study area.

Weeds

All weed locations (e.g. gorse) was recorded using a GPS and a waypoint and notes (species, number of plants) were recorded (see Appendix A). A new waypoint was taken when a clump of plants was divided from another clump of plants by 5 metres or more.

Root rot fungus

Five soil samples were taken at both the Comstock and Oceana mining lease areas. The sampling regime was aimed at sampling areas where it was more likely to obtain a positive result (e.g. drains on the edge of roads/tracks and disturbed sites). A sample was collected by digging up at least 500 grams of soil with a trowel under a plant species that is known to be susceptible to *P. cinnamomi* (e.g. *Sprengelia incarnata*). To eliminate the chance of contamination between samples, the trowel was thoroughly washed and disinfected with methylated spirits. Each of the sample sites was recorded using a GPS, and a waypoint recorded (see Appendix B). The collected samples were analysed by Forestry Tasmania's division of Biology and Conservation.

RESULTS AND RECOMMENDATIONS

Recorded weed species and pathogens

Numerous weed species have been recorded in the Zeehan region in the past (*Natural Values Atlas* data search – 14th August 2007). Table 1 and Figure 1 indicate the species and locations recorded in the past in the Zeehan region.

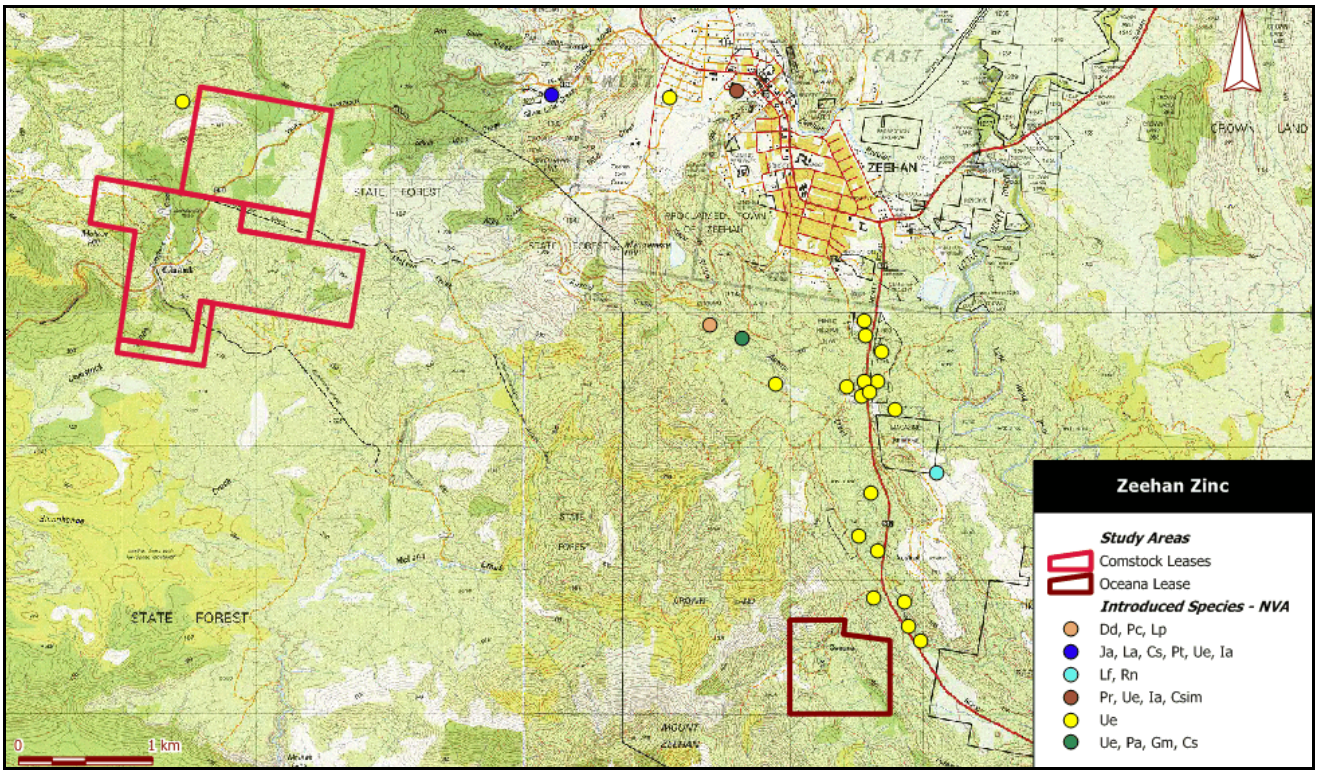

Figure 2. Location of recorded weed species in the Zeehan area (records from DPIW *Natural Values Atlas* data search – 14th August 2007). Refer to Table 1 for the species referred to in the legend.

Table 1. Known weed species recorded in the Zeehan area (DPIW *Natural Values Atlas* data search – 14th August 2007). Note: the code in brackets next to the species name is the species code in the legend of Figure 2.

Species	Name	Notes
Cotoneaster simonsii (Csim)	Himalayan cotoneaster	Local around the Zeehan township.
Cytisus scoparius (Cs)	English broom	Widespread in the area.
Danthonia decumbens (Dd)	Heath grass	One record on Austral Creek.
Genista monspessulana (Gm)	Canary broom	Widespread in the area.
Ilex aquifolium (Ia)	Holly	Local in the Zeehan township and Trial Harbour Road.
Juncus articulatus (Ja)	Jointed rush	Local on Trial Harbour Road
Leucojum aestivum (La)	Summer snowflake	Localised escapee from gardens.
Lonicera periclymenum (Lp)	Common honeysuckle	Localised escapee from gardens.
Phormium tenax (Pt)	New Zealand flax	Local on Trial Harbour Road.
Pinus radiata (Pr)	Radiata pine	Scattered in Zeehan region.
Poa annua (Pa)	Winter grass	Widespread.
Poa compressa (Pc)	Flatstalk meadowgrass	Common in Zeehan area.
Rorippa nasturtium-aquatica (Rn)	Two-row watercress	Local near Zeehan waste refuse site.
Ulex europaeus (Eu)	Gorse	Widespread and abundant.

Management of recorded weeds and **Phytophthora cinnamomi**

General weed management, hygiene and monitoring

Preventing the spread of weed species is the most cost-effective way to control weed species and *P. cinnamomi*. Machinery hygiene has been identified as an important management measure to minimise the risk of weed and disease introduction (e.g. Rudman *et al*. 2004). Information can be obtained for specific guidelines on machinery washdown from Rudman *et al*. 2004; *P. cinnamomi* management guidelines from Rudman (2005); and gorse management from the *Gorse National Best Practice Manual* (Gouldthorpe 2006). This latter document also provides good examples of best practice management that can be applied to the weed species located in and near the lease areas. The following prescriptions are applicable to all of the weed and disease species that have been recorded from both within and near the Comstock and Oceana mining lease areas.

General recommendations

The following are generic management recommendations that can be applied to both lease areas and surrounds to minimise the risk of spreading weeds and root rot fungus.

- Minimise high-risk activities in area (e.g. use of earth moving machinery or unnecessary clearing).
- Apply weed and *P. cinnamomi* hygiene prescriptions to manage high-risk activities (e.g. clearing new areas).
- Avoid as far as possible introduction of high-risk products to the area (e.g. gravel that has come from a quarry infected with *P. cinnamomi* or weeds are present).
- Only introduce products that are screened as free of weeds and *P. cinnamomi* contamination into the area.
- Apply weed and *P. cinnamomi* hygiene prescriptions to all vehicle use in the area.
- Encourage good hygiene practices by users (e.g. staff and contractors).
- Manage vehicle access (e.g. by having only one access point to mine area).

Machinery washdown procedures

The following recommendations are general. Specific procedures should be implemented following assessment of each activity. The following guidelines have been simplified from Rudman *et al*. (2004). This document should be referred to for washdown protocols for specific machinery types (e.g. excavators, bulldozers).

General guidelines

Washdown is advisable after:

- operating in an area affected by a weed or disease that is under containment (e.g. widespread gorse within the Oceana lease area); and
- transporting weeds or soil known to be infected with weed seed or a plant pathogen (e.g. transporting contaminated soil from the 'weedy' Oceana lease area to the weed free Comstock lease).

or before:

- moving machinery out of a local area of operation (e.g. Oceana lease area);
- moving machinery between areas (e.g. mining/exploration leases);
- using machinery along roadsides or along river banks (e.g. Comstock Creek and Trial Harbour Road);
- using machinery to transport soil and quarry materials (e.g. transporting contaminated soil from the 'weedy' Oceana lease area to the weed free Comstock lease); and
- using controlled-access vehicle tracks (e.g. only have one access point into the Comstock lease).

Selecting a field washdown site

Field washdown of machinery/vehicles may be required to contain weeds or plant pathogens to a particular area or where machinery is moved directly between field sites. In selecting a washdown site, consideration should be given to:

- siting the washdown at the edge, or nearby, any areas where weeds or pathogens need to be contained, choose sites where the land slopes back into an infested area or an adjacent area not susceptible to the problem;
- ensuring run-off will not enter any watercourse or waterbody (a buffer of at least 30 m is desirable);
- avoiding sensitive vegetation or wildlife habitat (e.g. remnant native vegetation and threatened species sites);
- selecting mud-free sites (e.g. well grassed, gravelled, bark or timber corded sites) that are gently sloped to drain effluent away from the washdown area;
- allow adequate space to move tracked vehicles; and
- avoiding potential hazards, e.g. powerlines.

Note that low loaders are not a suitable platform for washing machinery. Where there will be large quantities of effluent or there is a risk of extensive run-off, the washdown area should be bunded and a sump constructed to safely dispose of the effluent. Particular care needs to be taken if the effluent is likely to be contaminated with oils and similar chemicals. Mark or record washdown sites with the landowner or manager for subsequent monitoring and weed control.

General washdown procedure

- Locate washdown site and prepare the surface or construct bunding as required;

- Safely park the vehicle free of any hazards (e.g. electrical), ensure the engine is off and the vehicle is immobilised;
- Look over the vehicle, inside and out, for where dirt, plant material including seeds are lodged (pay attention to the underside, radiators, spare tyres, foot wells and bumper bars);
- Remove any guards, covers or plates if required being careful of any parts that may cause injury;
- Knock off large clods of mud, use a crow bar if required and sweep out the cabin;
- Use a vacuum or compressed air where available for removing dried plant material like weed seeds and chaff in radiators and other small spaces where this material lodges (brush off dry material if no other facilities are available);
- Clean down with a high pressure hose and stiff brush/crowbar; use only fresh water if washing down in the field;
- Start with the underside of the vehicle, wheel arches, wheels (including spare); next do the sides, radiator, tray, bumper bars etc and finally upper body; some vehicles may need to be moved during washdown (e.g. tracked machinery);
- Clean any associated implements (e.g. buckets);
- Check there is no loose soil or plant material that could be readily dislodged or removed;
- In wash bays, steam treat or rinse off vehicle with clean water; and
- Wash effluent away from vehicle; do not drive through wash effluent.

Specific weed and disease management

The following notes are for each of the weed species recorded within the Oceana and Comstock Mining Lease areas that are considered to be a threat to the environment and may become costly to manage if not contained. For further comprehensive information on the management of each of the species, the Department of Primary Industries and Water weed service sheets should be accessed. These sheets can be accessed at www.dpiw.tas.gov.au/inter.nsf/WebPages/SSKA-73U3QA?open.

Gorse (*Ulex europaeus*)

Description: Prickly perennial shrub that may reach a height and diameter of 3 m.

Flowers: Yellow flowers are produced in two flowering seasons – autumn and spring.

Habitat: Widespread and adaptable to most sites. Tends to dominate disturbed areas such as roadsides and can invade native vegetation.

Status: Declared weed in Tasmania and weed of national significance.

Recorded Locations in the Zeehan area: Widespread and abundant (Figures 3 and 4).

Target Areas: Localised small occurrences along Trial Harbour Road should be targeted for short term management. Long term management and control of gorse in and near the Oceana

mining lease should initially focus on containment so that the species will not spread to other sites (see machinery hygiene above).

General Control Measures:

Implement the general management measures described in this weed management plan. Management should occur in consultation with the West Coast Weed and Fire Management Strategy. A future monitoring strategy should be implemented for containment of the species

Further Reading:

For comprehensive general information on gorse, the *Gorse National Best Practice Manual* (Gouldthorpe 2006) should be accessed. For control actions for gorse refer to www.dpiw.tas.gov.au/inter.nsf/WebPages/RPIO-4ZW4ET?open and the management plan http://www.dpiw.tas.gov.au/inter.nsf/WebPages/TPRY-5GS6HP?open.

Blackberry (*Rubus fruticosus* agg.)

Description: Prickly stems (canes) that grow from a perennial crown, which tend to arch or trail. Thickets can cover hundreds of square metres.

Flowers: White flowers are produced in Spring followed by the distinctive fruits in the summer period.

Habitat: Widespread and adaptable to most sites, however generally invades unused and disturbed sites. Tends to dominate disturbed areas such as roadsides and creeks.

Status: Declared weed in Tasmania and as a weed of national significance.

Recorded Locations in the Zeehan area: Localised plants around the old mine workings at the Oceana Mine site (Figure 5).

Target Areas: Along the old tracks and around the mine workings at Oceana.

General Control Measures:

The small infestations along the old tracks and around the mine workings at Oceana should be sprayed.

Further Reading:

For control actions for blackberry refer to http://www.dpiw.tas.gov.au/inter.nsf/WebPages/RPIO-4ZW2MF?open and the management plan http://www.dpiw.tas.gov.au/inter.nsf/WebPages/TPRY-5GS6E7?open.

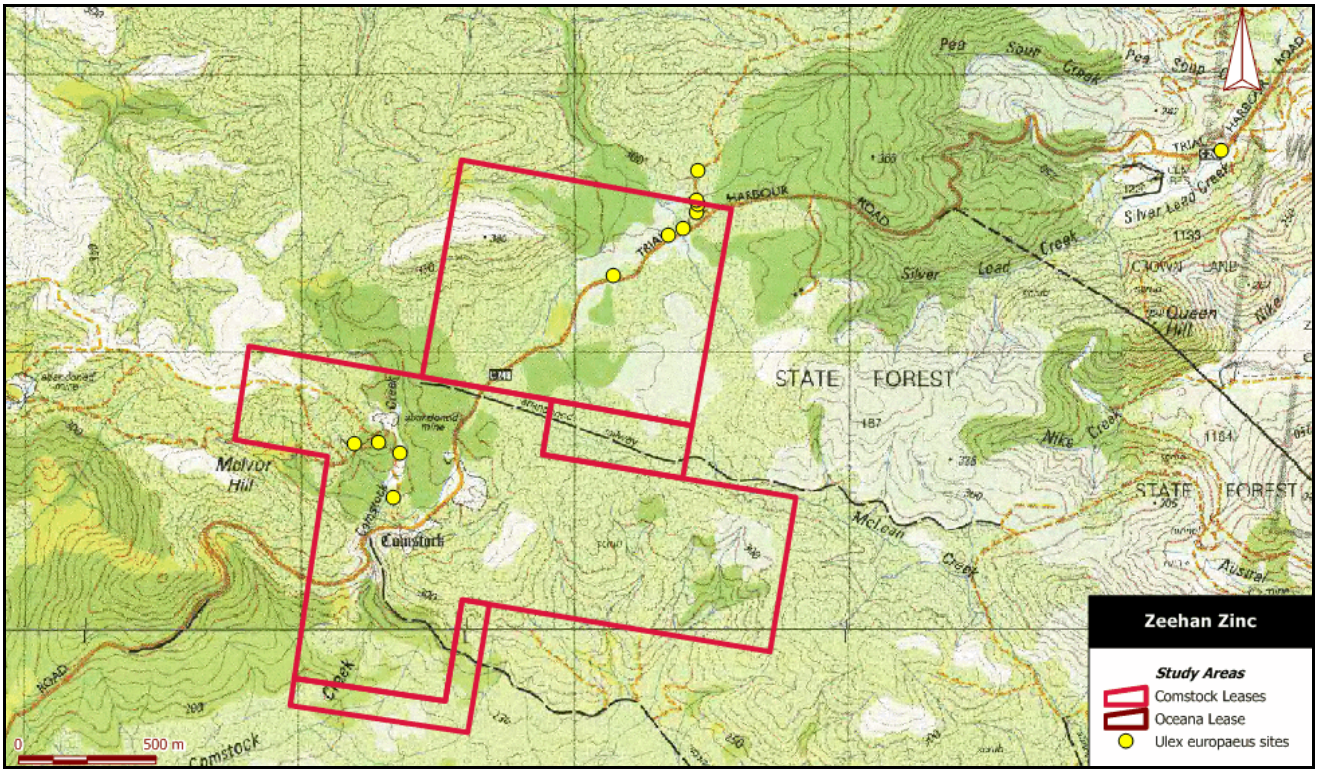

Figure 3. Recorded locations of gorse (*Ulex europaeus*) in and near the Comstock mining lease area.

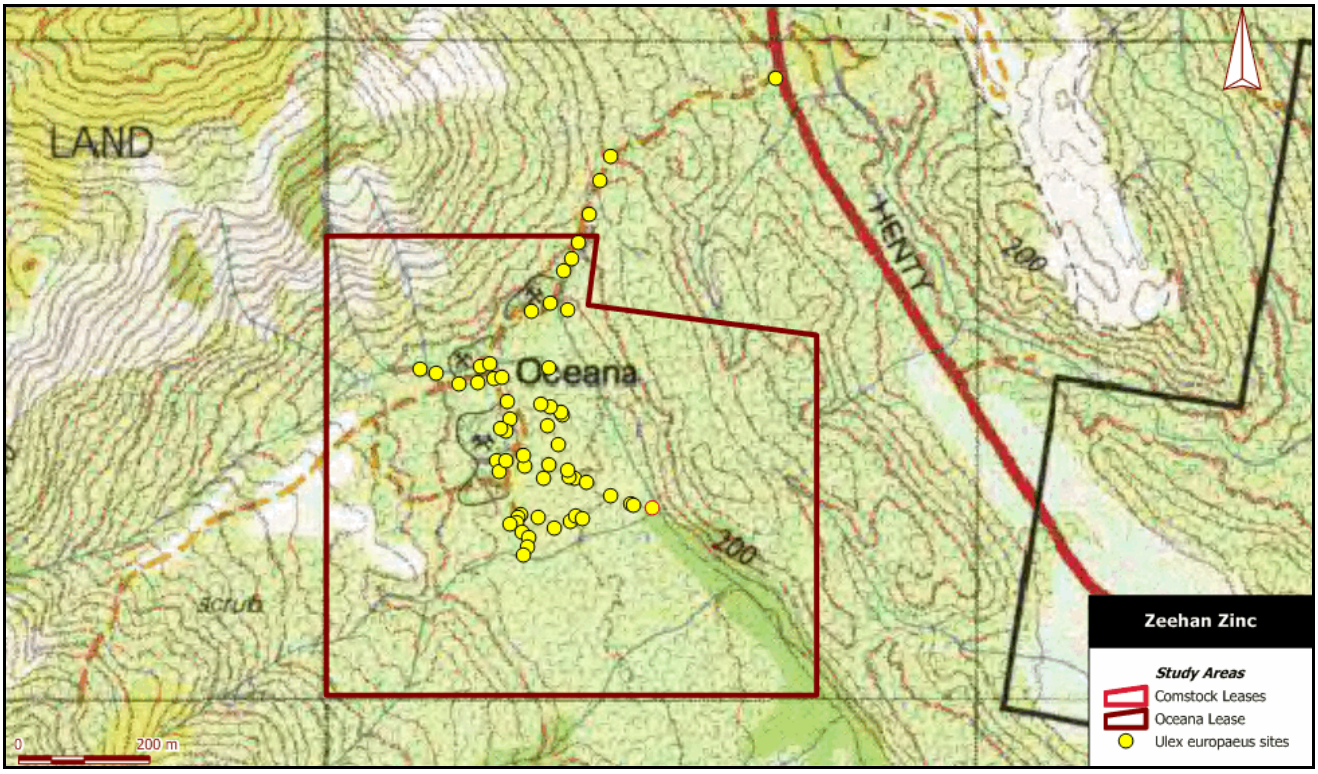

Figure 4. Recorded locations of gorse (*Ulex europaeus*) in and near the Oceana mining lease area.

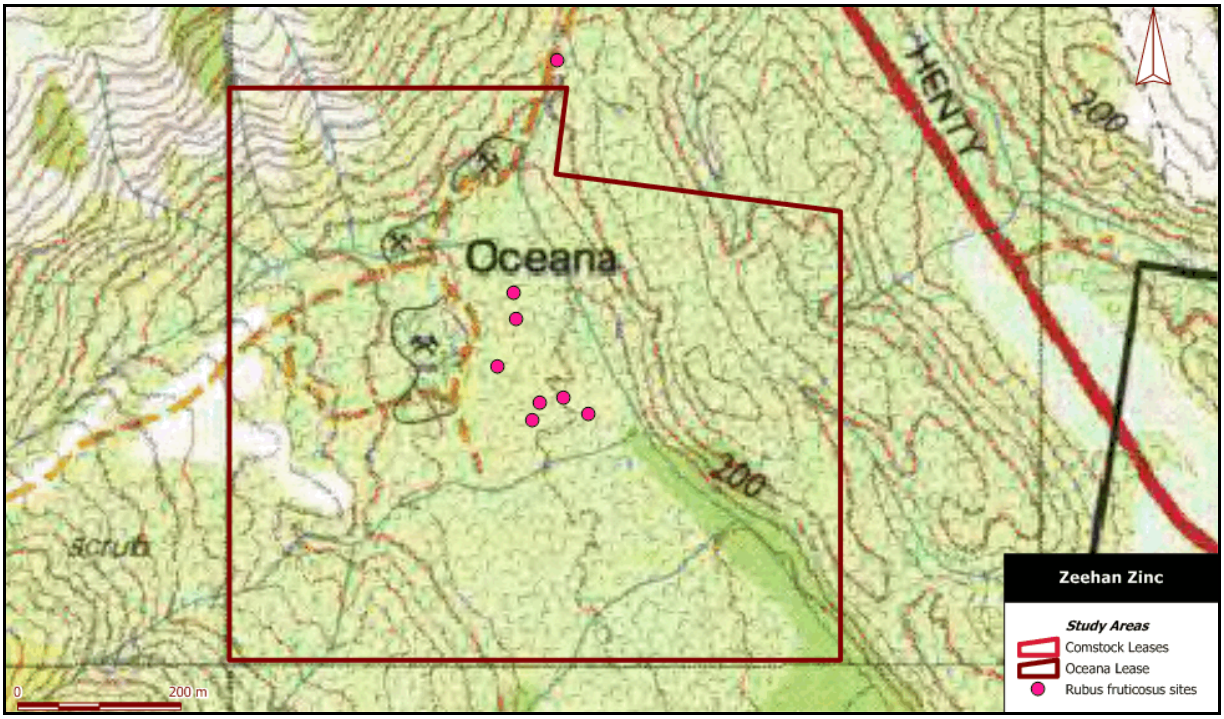

Figure 5. Recorded locations of blackberry (*Rubus fruticosus* agg.) in the Oceana mining lease area.

Himalayan honeysuckle (*Leycesteria formosa*)

Description: Much branched deciduous shrub with arching stems.

Flowers: On the west coast, the flowers are usually purplish (as in the image) during spring.

Habitat: Garden escapee; widespread and highly invasive, however, generally invades unused and disturbed sites (e.g. track edges at Oceana).

Status: Declared weed in Tasmania

Recorded Locations in the Zeehan area: Localised plants around the old mine workings at the Oceana Mine site (Figure 6).

Target Areas: Along the old tracks near the mine workings at Oceana.

General Control Measures:

The small infestations along the old tracks and around the mine workings at Oceana should be sprayed. Follow up monitoring should occur to record and control any future incursions.

Further Reading:

For the management plan of himalayan honeysuckle, refer to http://www.dpiw.tas.gov.au/inter.nsf/WebPages/JBRN-6VTV8J?open.

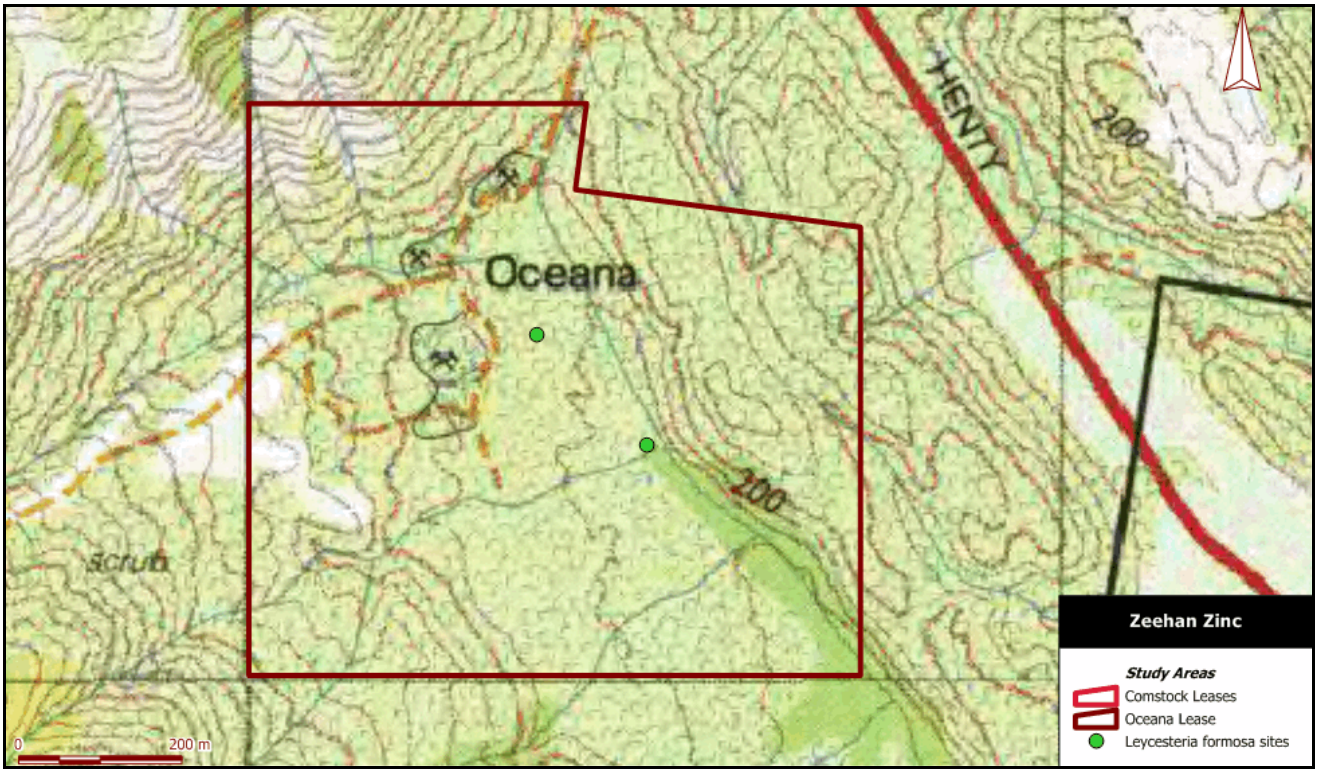

Figure 6. Recorded locations of himalayan honeysuckle (*Leycesteria formosa*) in the Oceana mining lease area.

Root rot fungus (*Phytophthora cinnamomi*)

Oceana Mining Lease

Root rot fungus was tested positive from soil samples taken from the Oceana Mining Lease area (Figure 7). The disease was located near the public access track to Mount Zeehan in disturbed vegetation associated with old mining works and vehicular tracks. The indicator species *Sprengelia incarnata* was senescent or dead at a number of sites. The sampling targeted areas that were more likely to return a positive result. See previous sections for guidelines for both the management of weed species and disease in the area.

Comstock Mining Lease

There were thought to be symptoms in the Comstock Mining Lease area (see French 2006), however, the indicator species at Comstock (*Sprengelia incarnata*) was observed to die even with very light disturbance from machinery or vehicles. Soil samples were located in the areas where it is likely for root rot fungus to occur (old tracks, drainage lines and drains) (see Figure 8 for the location of the sample sites).

The soil test results for this site indicated that the fungus was not present. However, during the assessment, the listed rare heath species *Epacris curtisiae* (northwest heath) was located on the track that goes up the ridge to the northwest of the lease (track with gate) (Figure 9). This species is highly susceptible to root rot fungus (FPA 2006).

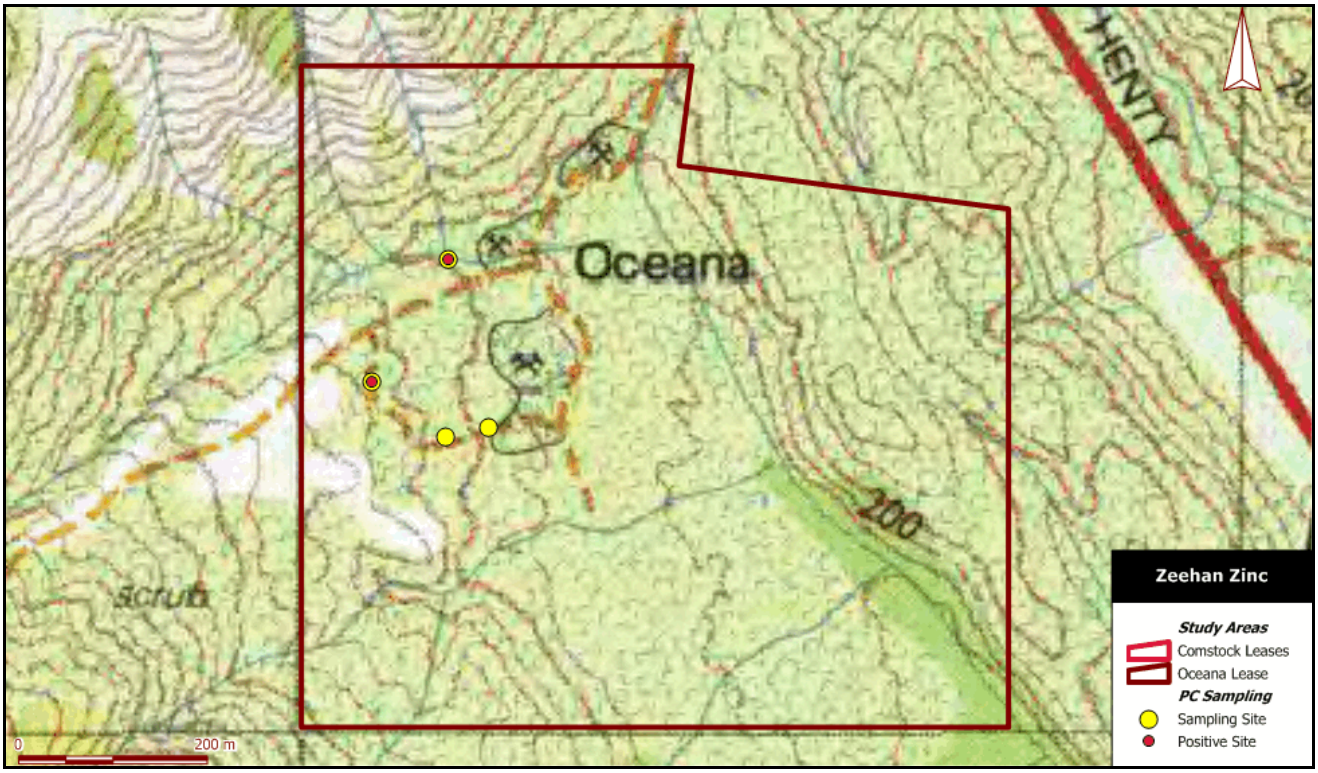

Figure 7. *Phytophthora cinnamomi* sample sites at the Oceana Mining Lease. Note the positive sites associated near with track to Mount Zeehan.

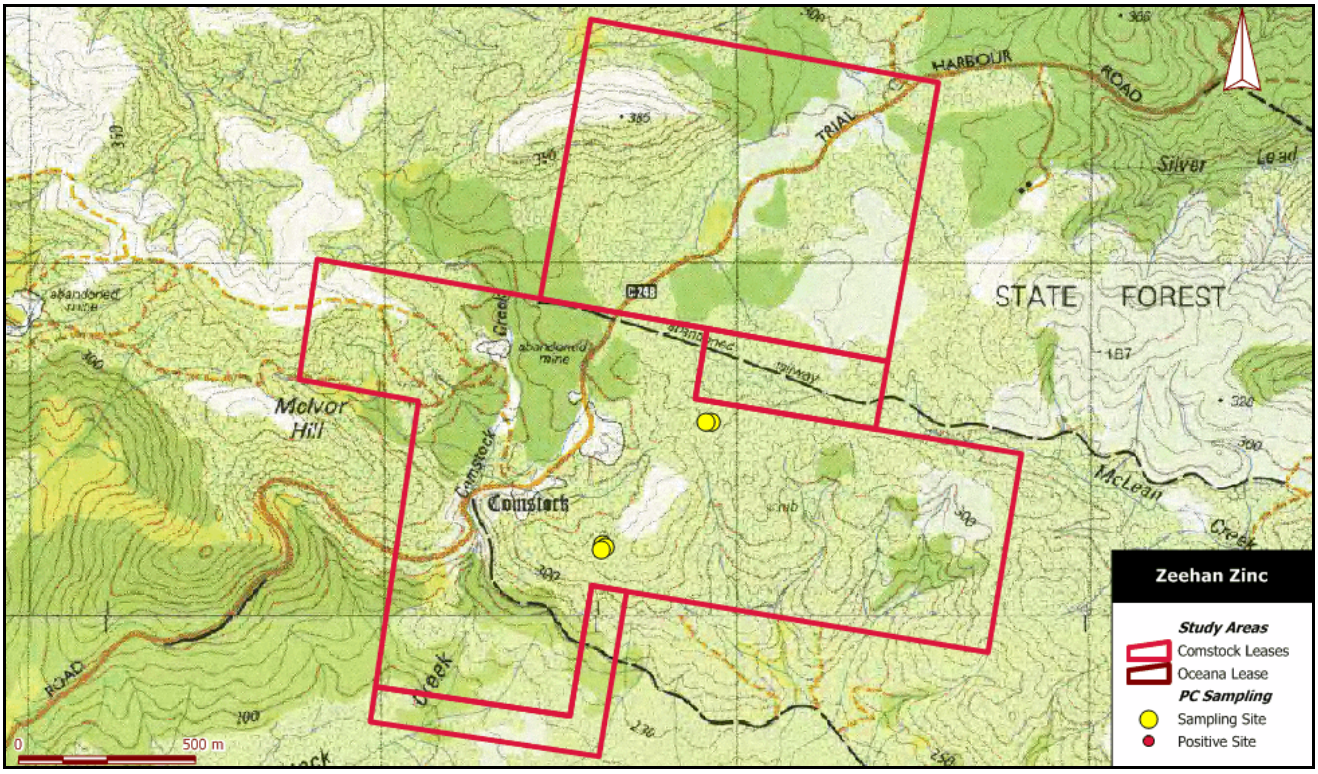

Figure 8. *Phytophthora cinnamomi* sample sites at the Comstock Mining Lease.

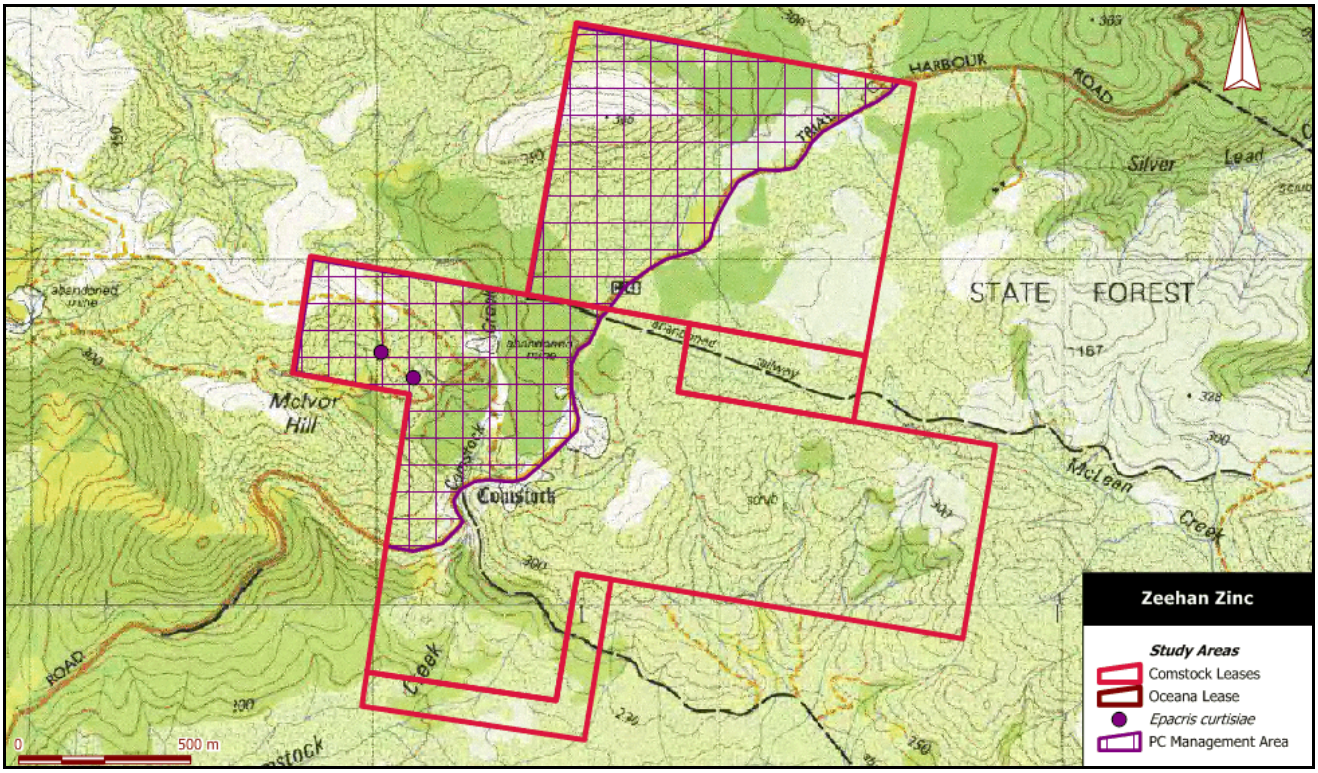

Figure 9. Location of the threatened heath species *Epacris curtisiae* (northwest heath) and proposed management area for the species.

General management and control measures of root rot fungus

The Oceana Mining Lease has a number of weed species and a positive result for *Phytophthora cinnamomi* (root rot fungus) soil analysis while the Comstock site has only minor infestations of weeds and a negative result for root rot fungus. The following recommendations are for consideration only and a co-operative approach between the key land management stakeholders in the Zeehan area should be considered. The following prescriptions are appropriate to both weed and disease control.

<u>Oceana</u>

- Implement weed control measures immediately to contain the potential of further spread.
- Consider a machinery washdown point at the intersection of the Oceana Mine road and the Henty Road. This will ensure the risk of spreading weed and disease is minimised. Vehicles should be washed down as they enter the site as well as exiting the site (see section 3.1 for further information on machinery washdown).
- All topsoil that is contaminated with weed and disease species should be stockpiled and quarantined so that control measures and containment can be implemented. The water from the stockpile should be diverted into a tailings dam/co-disposal area so that the risk of weed and disease spreading down waterways is minimised.
- Access to the site should be restricted to the one access point so that weed incursion can be minimised and all vehicles have to go through a washdown point.
- Staff and contractors should be aware of the weed and disease locations and should report any new incursions to the Zeehan Zinc Environmental Officer.

- Recreational walkers accessing Mt Zeehan should be made aware of the weed and disease problem and a walker washdown point for shoes should be made available at the start of the track. Furthermore, since the location of the positive root rot fungus samples is in the vicinity of the walking track, consideration should be given to diverting the track away from this area to reduce the risk of spread.

Comstock

- Implement weed control measures immediately to contain the potential of further spread.
- A vehicle washdown point should be considered at the main entrance to the Comstock mine. This would reduce the risk of weed and disease incursion to this currently weed free site (see section 3.1 for further information on machinery washdown).
- Access to the site should be restricted to one access point (the main entrance). This is effective in controlling weed incursion and clean machinery.
- All water should be contained within the Comstock Creek catchment. This will reduce the risk of root rot fungus from invading the weed and disease free vegetation surrounding the site. Little effort is required to achieve this goal as the existing topography contains the water to this catchment.
- The threatened plant *Epacris curtisiae* (northwest heath) location on the western side of the Trial Harbour Road should be considered as a special management zone. The zone should be advertised and staff/contractors made aware of the significance of the site and importance of hygiene. This is due to the susceptibility of the species to root rot fungus and the geographical importance of the population (most southerly record of the species, previously known from as far south as the Balfour area). Figure 10 indicates the location of *Epacris curtisiae* (northwest heath) and the recommended special management zone.
- Staff and contractors should be aware of the weed and disease locations and should report any new incursions to the Zeehan Zinc Environmental Officer.

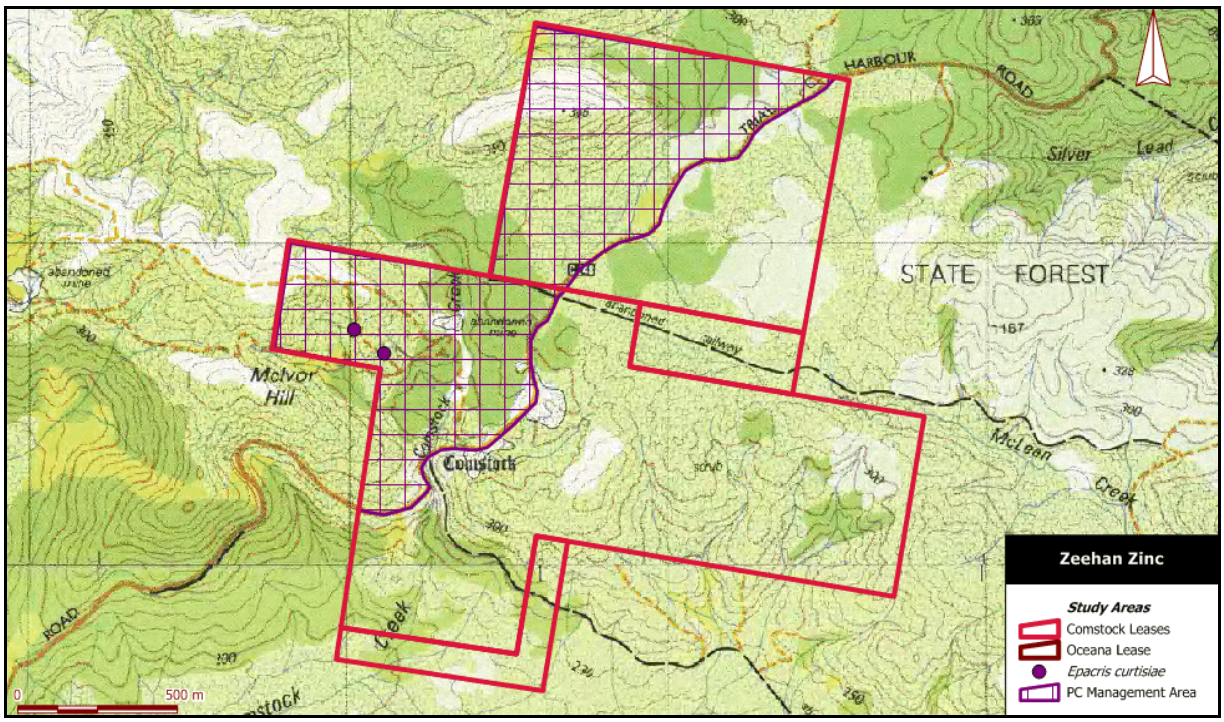

Figure 10. The location of *Epacris curtisiae* (northwest heath) and the special management zone (PC Management Area) on the western side of Trial Harbour Road.

Weed species with the potential to occur in the study area

Other weed species in the Zeehan area have the potential to become highly invasive. One such species, english broom (*Cytisus scoparius*) is widespread in the Zeehan region and was observed on the Trial Harbour Road near Zeehan (Figure 11). While this species is not considered a management issue at present, monitoring of the roadsides should occur so that further invasion can be controlled.

No other weed or introduced plant species recorded in the past are considered to be a management problem at this stage. However, continual monitoring and liaison with other land management stakeholders is important so that integrated strategies can be implemented for the long term control of invasive species.

Figure 11. The potentially highly invasive weed species english broom (*Cytisus scoparius*) growing with gorse (*Ulex europaeus*) near the Zeehan cemetery, Trial Harbour Road.

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APPENDIX A. Recorded weed location waypoints in and near the Zeehan Zinc Comstock and Oceana Mining Lease areas.

Note 1: On request, ECOtas can provide shapefiles of the locations for entry into GIS.

Note 2: The table below also includes the waypoints for the two recorded locations of *Epacris curtisiae*.

Waypoint	Easting	Northing	Date	Notes
1	358254	5361444	08/14/2007	Gorse
2	358453	5361590	08/14/2007	Gorse
3	358559	5361673	08/14/2007	Gorse
4	358560	5361704	08/14/2007	Gorse
5	358557	5361716	08/14/2007	Gorse
6	358563	5361825	08/14/2007	Gorse
7	358510	5361613	08/14/2007	Gorse
8	358367	5361472	08/14/2007	Cleared area - monitor for weed incursion
9	357228	5360835	08/14/2007	*Epacris curtisiae*
10	357133	5360906	08/14/2007	*Epacris curtisiae*
11	357310	5360831	08/14/2007	Gorse
12	357400	5360839	08/14/2007	Gorse
13	357478	5360800	08/14/2007	Gorse
14	357451	5360639	08/14/2007	Gorse
15a	360470	5361900	08/14/2007	Gorse
15b	360470	5361900	08/14/2007	Broom
16	362389	5357631	08/14/2007	Gorse
17	362392	5357603	08/14/2007	Gorse
18	362387	5357585	08/14/2007	Gorse
19	362378	5357589	08/14/2007	Gorse
20	362372	5357541	08/14/2007	Gorse
21	362376	5357524	08/14/2007	Gorse
22	362409	5357459	08/14/2007	Gorse
23	362405	5357454	08/14/2007	Gorse
24	362403	5357446	08/14/2007	Gorse
25	362392	5357444	08/14/2007	Gorse
26	362411	5357431	08/14/2007	Gorse
27	362422	5357424	08/14/2007	Gorse
28	362420	5357408	08/14/2007	Gorse
29	362414	5357396	08/14/2007	Gorse
30	362436	5357454	08/14/2007	Gorse
31	362460	5357438	08/14/2007	Gorse
32	362485	5357447	08/14/2007	Gorse
33	362494	5357457	08/14/2007	Gorse
34	362504	5357452	08/14/2007	Gorse
35	362484	5357477	08/14/2007	Blackberry

36	362493	5357498	08/14/2007	Blackberry
37	362491	5357513	08/14/2007	Gorse
38	362509	5357507	08/14/2007	Gorse
39	362521	5357504	08/14/2007	Blackberry
40	362547	5357486	08/14/2007	Gorse
41	362552	5357484	08/14/2007	Blackberry
42	362577	5357474	08/14/2007	Gorse
43	362582	5357473	08/14/2007	Gorse
44	362611	5357469	08/14/2007	Gorse
45	362599	5357465	08/14/2007	Himalayan honeysuckle
46	362483	5357516	08/14/2007	Gorse
47	362480	5357525	08/14/2007	Gorse
48	362444	5357513	08/14/2007	Gorse
49	362416	5357532	08/14/2007	Gorse
50	362412	5357548	08/14/2007	Gorse
51	362387	5357541	08/14/2007	Gorse
52	362441	5357542	08/14/2007	Blackberry
53	362451	5357535	08/14/2007	Gorse
54	362466	5357565	08/14/2007	Gorse
55	362449	5357593	08/14/2007	Gorse
56a	362464	5357600	08/14/2007	Himalayan honeysuckle
56b	362464	5357600	08/14/2007	Blackberry
57	362473	5357610	08/14/2007	Gorse
58a	362471	5357614	08/14/2007	*Cordyline australis* (cabbage tree)
58b	362471	5357614	08/14/2007	Gorse
59	362455	5357622	08/14/2007	Gorse
60	362460	5357632	08/14/2007	Blackberry
61	362439	5357627	08/14/2007	Gorse
65	362254	5357680	08/14/2007	Gorse
67	362279	5357674	08/14/2007	Gorse
68	362315	5357657	08/14/2007	Gorse
69	362343	5357660	08/14/2007	Gorse
70	362347	5357683	08/14/2007	Gorse
71	362361	5357687	08/14/2007	Gorse
72	362368	5357666	08/14/2007	Gorse
73	362381	5357667	08/14/2007	Gorse
74	362451	5357682	08/14/2007	Gorse
75	362425	5357768	08/14/2007	Gorse
76	362455	5357781	08/14/2007	Gorse
77	362481	5357770	08/14/2007	Gorse
78	362474	5357830	08/14/2007	Gorse
79	362486	5357849	08/14/2007	Gorse
80	362498	5357872	08/14/2007	Gorse

81a	362514	5357916	08/14/2007	Gorse
81b	362514	5357916	08/14/2007	Blackberry
82	362529	5357967	08/14/2007	Gorse
83	362547	5358005	08/14/2007	Gorse
84a	362798	5358123	08/14/2007	Broom
84b	362798	5358123	08/14/2007	Gorse

APPENDIX B. Phytophthora cinnamomi (root rot fungus) waypoints, sample locations and results from the laboratory soil test.

Note: On request, ECOtas can provide shapefiles of the locations for entry into GIS.

Waypoint	Easting	Northing	Date	PC Result	Notes
62	362310	5357500	08/14/2007	Negative	062-Oceana PC sample, moorland, tk edge
63	362265	5357490	08/14/2007	Negative	063-Oceana PC sample, moorland, tk edge up hill.
64	362186	5357548	08/14/2007	Positive	064-Oceana PC sample, moorland, in drainage line.
66	362268	5357678	08/14/2007	Positive	066-Oceana PC sample, on old track edge.
85	357735	5360379	08/14/2007	Negative	085-Comstock PC sample, moorland above open cut.
86	357743	5360373	08/14/2007	Negative	086-Comstock PC sample, moorland above open cut.
87	357729	5360365	08/14/2007	Negative	087-Comstock PC sample, moorland, track edge.
88	358043	5360728	08/14/2007	Negative	088-Comstock PC sample, moorland, under power line.
89	358028	5360726	08/14/2007	Negative	089-Comstock PC sample, moorland, near new pipe.