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ECOSYSTEM SERVICES

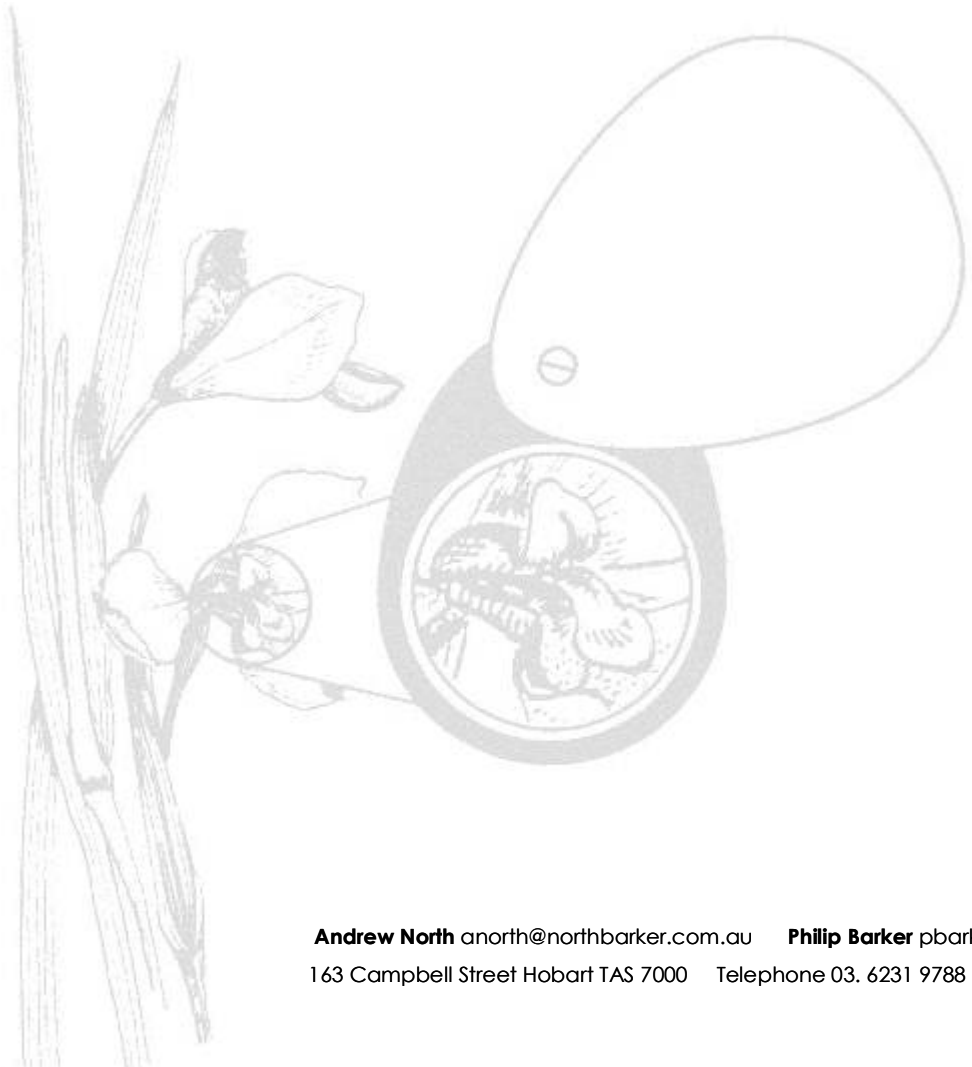
Tenth Legion Mine

Weed and Hygiene Management Plan

Australian Hualong

17th February 2021

PAS095



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Version Control

Version	Date	Author	Notes
1	15/03/2021	Philip Barker	

Abbreviations	***Definitions***
DPIPWE	Department of Primary, Industries, Water and Environment
EPA	Environment Protection Authority
WoNS	Weed of National Significance
NVA	Natural Values Atlas

1 Executive Summary

Australian Hualong Pty Ltd are proposing to mine ore from the Tenth Legion ML near Zeehan, Tasmania.

A flora and fauna -ecology assessment was completed by NBES (2021)[1]. The assessment included a desktop review of declared weeds and pathogens and an on-ground survey of the disturbance footprint. No declared weeds or soil borne pathogens were identified by field surveys. Full details of the surveys can be found in the 2021 report[1]. The area is relatively undisturbed and so the focus of the plan is to prevent the introduction of weeds into the mine.

The desktop survey revealed records for twelve (12) declared weeds within 5-kilometre radius of the survey areas. There are no recorded observations for declared or priority weeds within 500 metres of the survey area.

To minimise the risk of introduction of weeds the controls will include;

During construction

- Regular visual inspections of the borrow pits for weeds by onsite staff
- Interim Inspection of the areas by an independent flora and fauna consultant pre clearance and then every 12 months during operation.
- All earth moving vehicles and general vehicles will have been cleaned prior to entering the site and will be assessed by the Gradco site manager and recorded.
- As much equipment as is practical will be isolated to use within the mine only for the duration of the operation.

Post works

- Inspection by a flora and fauna consultant at completion and 6, 12 and 24 months post completion.
- Any weeds identified by the consultant will require advice and recommendations for eradication.
- Weed control actions will cease when the weed management consultant provides written advice that no further control actions are required.

Whilst the clearance and construction is being carried out the risk of introducing weed species and soil disease will be managed by the sole contractor carrying out the works through

hygiene controls of vehicles and equipment. Materials will not be imported to the site for the project unless proven to be from a site proven to be free of weeds and plant pathogens.

This Plan has been prepared in accordance with the Department of Primary Industries, Parks, Water and Environments (DPIPWE) *Weed and Disease Planning and Hygiene Guidelines*.

2 Purpose and Scope

The purpose of the weed and hygiene management plan (WHMP) is to provide details of the potential presence of weed and diseases and to provide mitigation measures to control, eradiate and prevent the spread of declared weeds and soil borne plant pathogens 'pathogens'.

3 Description of the Activity

Excavators, Loaders, Cartage Vehicles and 4WD vehicles will access the mine to extract earth and ore and peat and relocate the materials for processing or waste storage. The vehicles will be designated for use on the mine site only for the duration of the vehicles use unless the vehicle washdown protocol is implemented before re entry is allowed.

4 Site Description

The site is located near Zeehan Tasmania and is operated by Australian Hualong Pty Ltd. The Tenth Legion Mine TSF is located approximately 5 km west of the Zeehan township site.

The Tenth Legion mine proposal includes a waste rock dump, pits, access tracks, and a pipeline. The study area (Figure 1) is located approximately four kilometres to the west of Zeehan within the Tasmanian West bioregion. The Tenth Legion study area occupies approximately 39.1 hectares. Approximately 1.2 hectares is situated within the Mount Heemskirk Forest Reserve. The balance is a future potential production forest zone managed by Sustainable Timbers Tasmania. It is accessed via Trial Harbour Road (C248). The study area is situated within an altitudinal range between 240 m and 350 m (asl).

Tenth Legion mine is situated in the moist humid warm climatic zone and the mean rainfall is approximately 2400 mm per annum (based on the nearest weather station at Zeehan, 4.5 km to the east of the study area).

5 Objectives

The WHMP aims to provide procedures and guidance for the control of weeds and pathogens.

The objectives of the WHMP are as follows;

- document the distribution of weeds declared under the Tasmanian *Weed Management Act 1999*;
- document the distribution of weeds classified as Weeds of National Significance (WoNS);
- document the distribution of significant environmental and agricultural weed species i.e. those not formally listed as declared species but considered to have potential for a localised environmental impact e.g. as listed in *A Guide to Environmental and Agricultural Weeds of Southern Tasmania* (NRM South);
- document evidence of soil-borne pathogens;
- provide control measures for identified weeds and minimise risk of new weeds establishing and spreading;
- minimise the risk of introducing soil-borne pathogens to the site; and
- establish an ongoing monitoring and control program for weeds into the future for the site.

6 Supporting Documents

The primary data sources accessed during the background research include:

- Natural Values Atlas (NVA) - which provides a natural values report that identifies threatened fauna and flora records, raptors, Tasmanian Weed Management Act weeds, priority weeds and threatened vegetation communities within 500 m and 5 km of the study area;
- The *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) 'Protected
- Matters Search Tool' (PMST)– which provides a report that identifies any matters listed under the EPBCA within a 5000 m buffer around the study area; and
- Weed and Disease Planning and Hygiene Guidelines Preventing the spread of weeds and diseases in Tasmania. Published by: Department of Primary Industries, Parks, Water and Environment March 2015
- NBES (2021) Tenth Legion Mine Flora and Fauna Habitat Assessment.

7 Legislative Requirements and Relevant Guidance

The following legislation, guidelines, policy and plans apply to the preparation and implementation of this plan;

- Tasmanian *Weed Management Act* 1999
- DPIPWE, 2015, *Weed and Disease Planning and Hygiene Guidelines – Preventing the Spread of Weeds and Diseases in Tasmania*.
- Department of Primary Industries, Parks, Water and Environment (2015). Weed and Disease Planning and Hygiene Guidelines - Preventing the spread of weeds and diseases in Tasmania. (Eds.) Karen Stewart and Michael Askey-Doran. Department of Primary Industries, Parks, Water and Environment, Hobart, Tasmania. NRM South, 2017, *A Guide to Environmental and Agricultural Weeds of Southern Tasmania*.

The desktop search identified 12 plant types within 5 km that are listed as weeds under the Tasmanian Weed Management Act 1999. They are listed in Appendix B. There were no Declared or priority weed species recorded during the field assessment in any of the three survey areas.

8 Recorded Weed Species with 5 Kilometres of the Site

Field surveys were completed in December 2013, 2019 and 2021 by a NBES. The areas surveyed are shown in Figure 3. The weeds recorded within 5 kilometre radius of the site are list in Table 1.

Table 1: Extract from NVA search

Tas Management Act Weeds within 5000 m

Verified Records

Species	Common Name	Observation Count	Last Recorded
Austroderia richardii	toe-toe pampasgrass	2	05-May-2009
Cortaderia jubata	pink pampasgrass	9	12-May-2009
Cortaderia sp.	pampas grass	23	04-Feb-2014
Cytisus scoparius	english broom	7	23-Apr-2009
Erica lusitanica	spanish heath	91	13-Nov-2014
Foeniculum vulgare	fennel	1	22-Oct-2010
Genista monspessulana	montpellier broom	73	22-Oct-2010
Ilex aquifolium	holly	15	22-Oct-2010
Leycesteria formosa	himalayan honeysuckle	5	22-Oct-2010
Rubus fruticosus	blackberry	205	04-Mar-2015
Salix matsudana	sallow willow	1	15-Sep-2004
Ulex europaeus	gorse	91	04-Mar-2015

Only two exotic species were identified during the on-ground surveys. These are prunus *Centaurium erythraea and Prunella vulgaris*. Neither is considered a serious weed that poses a threat to natural values. No control is proposed.

No priority weeds or Tasmanian Management Act listed weeds were recorded on the NVA database within 500 metres of the survey areas.

8.1 Weed descriptions

Potential Weeds – Sightings within 5 Kilometres of the Site

The following declared weeds under the Tasmanian *Weed Management Act 1999* have been recorded within a 5- kilometre radius of the site;

Pampas Grass Species (*Austroderia richadii, Cortaderia jubata, Cortaeria sp.*)

Pampas grass is an aggressive environmental weed. A post construction survey will be carried out and if pampas grass is identified control measures will be implemented in accordance with DPIPWE guidance (refer Appendix A).

English and Montpellier Broom species (*Cytisus scoparius, Genista monspessuiana*)

Early identification of Broom species are critical for eradication and control. Regular inspection of the construction areas is required on a regular basis. If found, follow the control methods recommended in Appendix B.

Fennel (*Foeniculum vulgare*)

According to the *Fennel – Statutory Weed Management Plan* isolated occurrence of fennel are in the west coast area. Therefore, preventing the introduction of this weed into the area is critical. Pre-washing of machinery prior to attending site will be critical. Refer to Appendix I and J for control measures.

Holly (*Liex aquifollum*)

Holly is an ornamental plant often found in gardens. For recommended management refer to Appendix C.

Himalayan honeysuckle (*Leycesteria Formosa*)

Known by its common name, 'Elisha's Tears' this weed is found in wetter areas in the north west and west of Tasmania. The bush can form dense thickets and can smother other vegetation. For control measures refer to Appendix D.

Blackberry (*Rubus fruticosus*)

Blackberry is a serious and highly invasive weed. Refer to Appendix E

Sallow willow (*Salix matsudana*)

If willow species are identified during construction activities or during the in the post construction field survey, then a specific Willow Management Plan will be required to be produced to eradicate willow from the area. Control measures will depend on the infestation extent and location and must comply with the Tasmanian Willow Management Plan. Refer to DPIPWE website https://dpipwe.tas.gov.au/Documents/willow_WMP_2011.pdf

Gorse (*Ulex europaeus*)

Gorse is relatively widespread throughout most parts of Tasmania. It is a serious weed and eradication can be difficult. Refer to Appendix F for recommended eradication and control measures.

Wattle (*Acacia baileyana)*

Wattle is well adapted for survival in the bush. Refer to Appendix H for control measures.

- Weed Management and Hygiene Control Measures
- Prevention Measures

The following prevention measures will be implemented;

- All vehicles will be washed prior to entering the Australian Hualong site. The contractor will ensure that all vehicles and excavation vehicles will be washed at either the contractor depot or alternative truck wash before making the trip to Australian Hualong. This will be strictly implemented by the contractor. Refer to Appendix L.
- Only one contractor will be supplying vehicles for the project and therefore control over vehicle washing will be easily coordinated
- A truck wash will be set up on the site as a secondary measure in the event that further washing of vehicles is required prior to entry of the pits. The Gradco site manager will direct vehicles to the washdown area and the vehicle will be washed down and sprayed with Phytophthora Clean ™ if determined to need so based on condition of the vehicle or if it is new to site and use history is considered.
- washdown water will go into an isolated pond system designed and constructed by the contractor. All drainage once collected in the pond will flow to the settling pond. No Herbicide is to be used only a spray of as Phytophthora Clean ™ when required.
- A vehicle washdown register will maintained on site.
- In relation to the LV's – any LV that will on the site will go over the Australian Hualong wash at the entrance.
- The contractor bus which will remain on site will be utilised to ferry operators to their machines. This will reduce traffic movement to the pits.

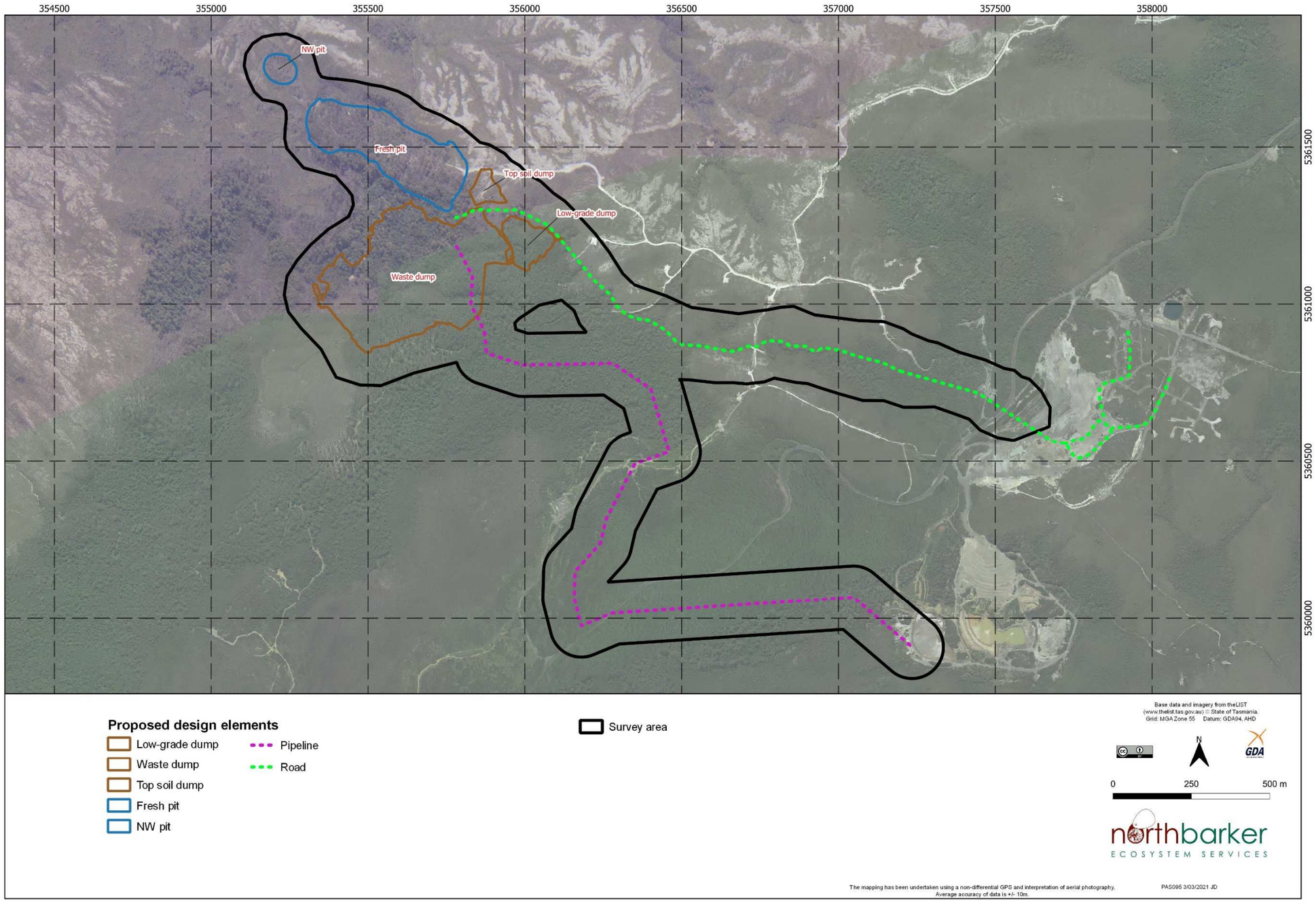

Figure 2*: Weed and Disease Survey Areas*

9 Recorded Pathogens

The desktop search did not reveal any known pathogens within 5-kilometre radius of the study area. No pathogens were found during the on-ground survey.

9.1 Recorded Diseases and Symptoms

As reported in the NBES assessment (2021) there are no recorded symptoms of disease..

9.2 Soil Pathogens

Although there was no reported presence of soil pathogens precautionary measures will be undertaken to prevent the spread of Phytophthora cinnamomic and Chytridiomycosis disease.

Phytophthora cinnamomi Infestation Phytophthora cinnamomi (root rot fungus or cinnamon fungus) is an introduced pathogen that attacks the roots of over 130 Tasmanian plant species. It can change the structure and composition of vegetation, and reduce plant species diversity and resources, with resultant flow-on effects to fauna. As such, it is the only pathogen listed as a 'threatening process' under the EPBC Act, and is also considered a threat under the TSP Act. Phytophthora cinnamomi can be introduced to an area by spores carried on vehicles and machinery, with human activities primarily responsible for introducing the pathogen into new areas. Once established, it can spread rapidly by water transport, root-to-root infection and animal digging, and is impossible to eradicate (FPA 2012). While this pathogen has not been previously detected within the ML, it is possible it may be introduced (and/or spread) during construction and operation. The forest vegetation mapped within the mine footprint is susceptible to Phytophthora cinnamomi infestation (Schahinger et al. 2009). However, the heathy non forest vegetation is moderately to highly susceptible. Hygiene protocols must therefore include measures to minimise the risk of introduction and/or spread of this disease. Should signs of Phytophthora cinnamomi infestation be observed prior to, during or following construction by the contractor, mine manager or others, these should be confirmed with soil tests as per Rudman (2005).

Potential Chytridiomycosis Infection Chytridiomycosis disease (Chytrid), caused by the fungal pathogen Batrachochytrium dendrobatidis, currently threatens Tasmania's native amphibians with disease that may kill individuals and populations. The fungus infects the skin of frogs, destroying its structure and function. The mouthparts of tadpoles can also be infected. Infection by such a disease is recognised as a threatening process under both State and Commonwealth legislation. The fungus has not previously been recorded on site, though may be present or introduced during Construction. Chytrid can cause direct mortality in adult individuals, with the extinction of one frog species from mainland Australia attributed to this infection. The Chytrid fungus can be spread in water and mud on boots and vehicle tyres.

Development activities associated with the project have the potential to introduce the disease to the Management Area, unless measures to prevent the introduction of the disease on site are implemented.

9.3 Control Measures

The following follow up control measures will be implemented;

- An independent flora consultant will complete a field survey for weeds in the pit areas at intervals of 3 and 6 months after commencement of works and within 3 months of completion of works.

- The independent consultant will make written recommendations as to follow actions required to eradicate weeds if required.

10 Management Actions

10.1 Weed control and Hygiene measures

The management priorities will be to prevent the introduction of weeds and pathogens into the pit areas. Challenges will be ongoing communication with staff to enforce the procedures and inspection of all vehicles by the site manager to ensure that only clean vehicles are permitted to enter the pit areas.

The works will be managed by one manager only and therefore control over vehicle movements should be relatively simple to control. In addition, there will be minimal movement of vehicles on and off the site for the life of the project.

The following follow up control measures will be implemented;

- An independent flora consultant will complete a field survey for weeds in the pit areas at intervals of 6 months after commencement of works and within 3 months of completion of works.

- The independent consultant will make written recommendations as to actions required to eradicate weeds if required.

See **Appendices A-I** for weed control methods

See the Washdown Guidelines for Weed and Disease Control for detailed information on how to wash-down equipment and personnel to reduce the chance of spreading weeds and pathogens..

See **Appendix J** for Washdown procedure.

10.2 Communication

All contractor staff involved in the project will be required to comply with this Plan. Staff will be reminded of the hygiene controls and that the preference will be for vehicles to arrive at the site in a clean condition and that checks of the vehicle will be required upon arrival and any vehicles not observed to be in a clean condition by the site manager will be required to be washed prior to entry to the pits.

10.3 Record Keeping

Records will be maintained of vehicles arriving at the site and the condition of the vehicles upon arrival.

10.4 Monitoring

An assessment of the pit areas will be completed by an independent flora and fauna consultant at intervals of 3 and 6 months after commencement of works and within 3 months of the conclusion of works. The consultant will provide written recommendations for actions to ensure compliance with the *Tasmanian Weed Management Act 1999* and this Plan.

10.5 Permit and Signage

The site entry procedures will ensure that all visitors will be screened prior to entry to the site. The Mine Manager will confirm entry requirements for vehicles prior to permitting entry to the site.

The following signage will be displayed at the site entrance and entrance to the borrow area;

"Weed Control- Borrow Pits

Prior to entry to the borrow areas all vehicles must be cleared by the Site Manager before entry.

"Unclean vehicles to be washed at the washbay"

11 Conclusion

The site is free of weeds and disease and is considered low risk of contamination. This is because there are no soils being imported to the site there is a single operator using designated equipment and employing good hygiene standards. This plan will add a structured management process to further reduce risk.

Communication and signage will ensure all new (on site) or dirty equipment is cleaned and treated with Phytophthora Clean ™ before entering the Borrow Area.

Vehicles and washdowns will be recorded and 3 monthly reviews will ensure any failures are detected and weeds / disease eradicated.

12 References

Department of Primary Industries, Parks, Water and Environment, March 2015, Weed and Disease Planning and Hygiene Guidelines Preventing the spread of weeds and diseases in Tasmania.

North Barker 2021. Tenth Legion Mine – Botanical Survey and Fauna Habitat Assessment

Appendix A – Pampas Grass Control – Extract from DPIPWE

See website: https://dpipwe.tas.gov.au/invasive-species/weeds/weeds-index/declared-weeds-index/pampas

***(Cortaderia* species)**

What is pampas?

- Pampas is an aggressive environmental weed.
- There are three species of pampas in Tasmania: *Cortaderia selloana,* common pampas grass*, C. jubata,* pink pampas, and *C. richardii*, toe toe. Their features are similar so for practical purposes they are treated as one weed. All are large, vigorous, dense, tussocky perennials.
- Pampas is a **declared weed** in Tasmania under the Tasmanian *Weed Management Act 1999*. The importation, sale and distribution of pampas are prohibited in Tasmania.

How to identify pampas

- Pampas are large, tussock-forming grasses; tussocks can be a metre or more in diameter and over 2 metres high.
- Pampas leaves grow up to 2 m long, are thin and tapered to a fine tip. The large and showy, plume-like flower heads can reach 4 metres in height and vary in colour from white-yellow-pink. Pampas flowers and sets seed in autumn.
- For help in identifying pampas, search the Dennis Morris Weeds and Endemic Flora Database for pampas illustrations. If you are still in doubt about the weed you are dealing with, contact Biosecurity Tasmania on 03 6165 3777 for help.

Image top: Pampas flowering plant, © Karen Stewart, DPIPWE
Images above, L-R: *Cortaderia richardii* flowering plant, © Karen Stewart, DPIPWE; Flowering pampas plants, © Tim Rudman, DPIPWE; Close-up of male pampas flower.

Pampas in Tasmania

- Pampas is widespread in Tasmania, occurring in coastal and bushland vegetation, silvicultural operations, quarries, neglected areas, road and rail corridors, and creek and swamp verges. Pampas is also found in gardens and as wind-break plantings.

- Pampas can rapidly colonise disturbed or burnt areas in a range of vegetation types from coastal scrub to closed wet forest, where it readily out-competes native vegetation. Pampas is problematic for the forestry industry, and can impede access along roads, walking tracks and coastal recreation areas. Pampas is also highly flammable and poses a significant fire hazard.

What is the legal status of pampas in your area?

- The legal responsibilities of landholders and other stakeholders in dealing with pampas are laid out in the Statutory Management Plan for Pampas.

- Use Table 1 (Zone A municipalities) in the Statutory Management Plan for Pampas to find out whether these weeds occur in your municipality.

Detailed management and control guidelines for pampas can be found in the Pampas Control Guide. Refer also to Herbicides for Pampas Control. For further information see DPIPWE's Weed Links and Resources.

Pampas Control Guide

Do

- Plan your control program, this will save time and money in the long-run;
- Coordinate your control program with neighbouring landholders where your pampas problem crosses property boundaries;
- Use a combination of different control methods: combining both physical and chemical measures can be effective;
- Be sure to eradicate every last plant: pampas seedlings may continue to 'appear' at a treated site, indicating that a parent plant is still present in the area;
- Remove all root material in the ground, as pampas can regrow from these root fragments;
- Ensure machinery and equipment is washed down between sites or prior to contractors leaving site;
- Revisit the site and use follow-up treatments over at least several years.

Don't

- Don't let pampas plants set seed - stopping seed production is the key to stopping the spread of the weed;
- Don't leave root fragments in the ground, as pampas can regrow from these root fragments;and
- Don't dump live pampas material, as this can spread seed and allow plants to regrow from root fragments.

Spread of pampas

- Pampas reproduce mainly by seed, but can also grow from root fragments.
- Sexual reproduction varies between pampas species. *C. selloana* needs the presence of both the female and bisexual plants for pollination and seed set, while *C. jubata* plants are all female and produce large quantities of seed without the need for pollination. Up to 100, 000 seeds can be produced per flower head. Seeds are light and can be windblown for distances of up to 25 km.
- Pampas can also spread via fragments of rhizome (underground stem) being moved during cultivation, on dirty equipment and machinery or when pampas material is dumped and allowed to regrow.

- See the Washdown Guidelines for Weed and Disease Control for detailed information on how to wash-down equipment and personnel to reduce the chance of spreading pampas.

Physical removal

- Small pampas plants can be removed manually by hand-pulling or digging out the entire plant with a mattock. Ensure all root material is removed.
- Plants can be slashed with a brushcutter or burned to make root removal with a mattock easier.
- Larger plants may require machinery to remove the whole plant including the root system.
- Removed pampas material should be burned or buried more than 1 meter deep. Plants can also be left upside down with roots exposed to die. Never dump live pampas with root material as pampas can regrow from root fragments.
- To prevent seed spread, cut and remove flower heads as soon as they appear in autumn, and securely bag and dispose of.

Burning

- Pampas can be burned to reduce mass and prevent flowering.
- Plants can regrow from roots left in the ground, so follow up after burning is essential.
- Pampas is highly flammable, and care is needed when burning.

Grazing or replanting

- Where possible, graze infested areas or replant to native tree and shrub species.

Chemical control

- A number of herbicides are registered for use on pampas in Tasmania. See Herbicides for Pampas Control for more information.

Appendix B: Broom Species Control – extract from DPIPWE website

Website reference: https://dpipwe.tas.gov.au/invasive-species/weeds/weeds-index/declared-weeds-index/broom

English broom (*Cytisus scoparius*), flax-leaf broom (*Genista linifolia*), and Montpellier broom (*Genista monspessulana*)

Image above: Montpellier broom in flower, © RMC.

What is broom?

- Widely cultivated across Australia for ornamental purposes, brooms are significant environmental weeds that invade native vegetation, plantation and pastoral systems in Australia causing significant environmental and economic impacts, capable of completely transforming invaded habitats.
- Three species are recognised as Weeds of National Significance (WONS): English (or Scotch) broom (*Cytisus scoparius*), flax-leaf broom (*Genista linifolia*), and Montpellier (or Cape) broom (*Genista monspessulana*).
- **These species are all present in Tasmania**, each a **declared weed** under the *Tasmanian Weed Management Act 1999*. The importation, sale and distribution of English broom, flax-leaf broom, and Montpellier broom are prohibited in this state.

How to identify broom

- English, flax-leaf, and Montpellier broom are small to medium sized shrubs which can grow up to a height of 3 m. The leaves are trifoliate, (each leaf divided into 3 leaflets), with the central leaflet being longer than the outer two leaflets.

- Leaflets and young stems of flax-leaf broom are covered in woolly, grey hairs, giving the plant a silvery look when viewed from afar.
- Broom flowers are bright yellow, growing in dense clusters at branch ends, appearing late winter to late spring.
- Brooms grow quickly, produce large amounts of seed in pods, and can tolerate diverse environmental conditions. When the seeds are mature and still attached to the parent plant, the pods open explosively to eject the seed up to 3 metres.
- Brooms establish rapidly after disturbance such as fire or grazing, but can also invade relatively undisturbed areas.
- If not controlled, brooms can modify native ecosystems by increasing the frequency and intensity of fire, changing vegetation structure, altering soil chemistry and providing harbour for invasive animals.
- Although effective control measures for broom exist, its ability to rapidly re-establish from a persistent seed bank necessitates intensive follow-up.
- For further information or help in identifying English broom, flax-leaf broom, or Montpellier broom, refer to the Commonwealth government WONS web site, Weeds of National Significance – Broom.
- For help in identifying English broom, flax-leaf broom, or Montpellier broom, also search the Dennis Morris Weeds and Endemic Flora Database for broom illustrations. If you are still in doubt about the weed you are dealing with, contact Biosecurity Tasmania on 03 6165 3777 for help.

Images top row, L-R: English broom seed pod, invading bushland, (© Matthew Baker); & English broom flowers, (© Marty Bower).

Images bottom row, L-R: Montpellier broom leaves, flowers, flower close-up, & invading bushland, (© Matthew Baker).

Broom in Tasmania

- A shrub in the pea family, (Fabaceae), broom is native to Europe and the western Mediterranean. Widely naturalised on mainland Australia, brooms occur in New South Wales, Victoria, South Australia and Western Australia.
- Brooms were originally introduced to Tasmania as garden plants.
- English broom occurs throughout the settled areas of the state, being locally abundant on roadsides, waste areas, poor quality pastures and in disturbed bushland.
- Montpellier broom is widely distributed in Tasmania's north, north-east and in the south.
- Flax-leaf broom is known to be naturalised in several locations in the south and north-west. Given time, this species could become more common as an invader of bushland, roadsides and disturbed sites throughout Tasmania.
- Broom can form dense thickets in degraded pasture and reduce productivity and access. Broom along roadsides can reduce visibility and increase road maintenance costs. Dense thickets of broom can also provide cover for pest animals such as rabbits.
- Broom also invades a wide range of native vegetation including native grassland, woodland/open forest and subalpine grassland, where it competes with native plants and alters fauna habitat.

Images above, L-R: flax-leaf broom dried seed pods, (© ALA, Jackie Miles); flax-leaf broom mature plant in bushland, (© QBIT, Uni of Q'ld); flax-leaf broom flowers, (© Xemenendura, Wikimedia).

Legal status of broom in your area?

- The legal responsibilities of landholders and other stakeholders in dealing with broom are laid out in the Statutory Weed Management Plans for Montpellier broom, and English broom.

- Detailed management and control guidelines for broom can be found in the Broom Control Guide below. Refer also to Herbicides for Broom Control. For further information see DPIPWE's Weed Links and Resources on this site.

Broom Control Guide

Do

- Plan your control program, this will save time and money in the long-run;

- Consider the impact of your control methods on off-target species, especially if herbicides are used;

- Ensure machinery and equipment is washed down between sites or prior to contractors leaving site;

- Get in early - for new infestations, eradicate before the plants reach the flowering stage: once plants begin seeding, control becomes more difficult and expensive;

- Carefully time your use of herbicide for best results (see Herbicides for Broom Control for more information);
- Coordinate your control program with neighbouring landholders where your weed problem crosses property boundaries;
- Revisit and regularly inspect the site and ensure follow-up treatment is undertaken;
- Use a combination of different control methods; and
- Establish vigorous pasture (or native species) after removal to reduce re-infestation.

Don't

- Don't introduce broom to broom-free areas (e.g. by failing to wash down machinery and equipment between sites);
- Don't start your control program without first planning your approach;
- Don't allow broom to flower and set seed before treatment;
- Don't rely on one attempt at removal - follow-up is essential;
- Don't rely on just one control method;
- Never burn broom without follow up treatment of regrowth; and
- Do not burn broom in native vegetation.

Spread of broom

- Broom spreads solely by seed. The bursting pods can eject seed for 1 to 3 metres from the parent plant. Ants may also disperse seeds. Dry pods containing seeds can also be blown short distances by wind.
- Broom seeds are not buoyant in water but can be carried in the bed load of rivers and streams, resulting in long distance dispersal downstream. Long distance seed movement can also occur in mud and soil carried on road graders and earth moving equipment, farm machinery, vehicles and footwear and in sand and gravel from quarries.
- Seed can also be carried within the digestive tracts of horses and other animals. Contaminated agricultural produce may also result in some spread.
- Germination usually occurs after some soil or vegetation disturbance including cultivation, fire, slashing, herbicide treatment, road-making and pig-digging. However, broom can also invade native vegetation without major disturbance.

Avoiding the introduction of broom

- If cultivation must be carried out in infested areas, ensure all equipment is cleaned and checked for broom seed before moving to un-infested areas. If possible, always work un-infested areas first.
- Gravel and sand should not be removed from infested quarries and streams.
- Broom growing along access tracks must be controlled to limit spread of seed. Vehicles, bush walkers and horse riders using infested areas should keep to designated routes to minimise the spread of seed.

Physical removal

- Small or isolated plants can be hand pulled or grubbed in spring when the ground is soft; a beneficial approach when working in high value native vegetation.
- Cutting seedlings when they are 5 to 10 cm high can provide effective control of regenerating plants.
- Larger shrubs should be cut close to ground level and the stumps painted with herbicide.
- Dense thickets can be slashed with a brushcutter and regrowth sprayed with herbicide.
- In large infestations with an established seed bank, cut stems bearing viable seed should be left on-site to prevent accidental spread.
- See Herbicides for Broom Control for more information.

Cultivation

- Pasture improvement is the best method of control for broom infested pastures on arable land where large plants can be mechanically removed, followed by repeated cultivation, pasture establishment and grazing.
- Some dense infestations have been destroyed by bulldozing and repeated cultivation over two years. However, soil disturbance will move seed from the surface and distribute it through the soil profile and may in some instances make long term eradication more difficult, so follow-up control will be necessary.
- In accessible areas, (eg, plantations or pastures), equipment can be used to mulch large, non-seeding broom infestations. The layer of mulch may suppress broom germination and regrowth temporarily, thereby assisting with follow-up measures.

- Ensure machinery and footwear is cleaned and free of soil prior to leaving the site. Avoid driving vehicles or machinery through infestations when seed pods are present, as they can explosively release seed that may lodge on vehicles.

Burning

- Burning can be an effective first step in managing broom by removing above ground biomass and reducing the broom seed bank; (heating of the soil by fire can stimulate the germination of up to 90% of seed in the soil).

- To prevent more infestations from developing, sustained follow-up control is required each year to kill re-sprouting plants and new seedlings.

- Post-fire, hand weeding or herbicide application should be carried out as soon as ecologically feasible, but care is required to minimise herbicide impact on regenerating native species.

- When pasture species cannot be established on burned areas (e.g. stony ground, creek banks), or regeneration of native species is required (conservation areas and bushlands), do not use fire to remove broom.

- In heavily infested areas, wildfire contingency plans should also include broom management.

- Note: Great care is needed when using fire. Appropriate conditions, equipment and experienced personnel are essential. The landowner is responsible for ensuring that all planned burning can be contained and is conducted in a safe manner. Prior to any planned burn being undertaken, the landowner must inform all relevant authorities and obtain all relevant permits. The Tasmania Fire Service is the responsible authority for granting fire-permits.

Grazing

- Sheep and goats will graze broom seedlings and flowers and assist in preventing infestations.

Biological control

- Biological control is the use of a living species, usually an insect, mite or disease, to control a weed.

- Biological control will not eradicate broom, but may be used in conjunction with other control methods.

- Biological control agents for English broom that have been released in Tasmania include the twig mining moth and the broom bud psyllid.

- For more information on biological control programs in Tasmania contact the Tasmanian Institute of Agriculture.

Native vegetation

- In native vegetation, preventing ground disturbance will help reduce the rate of invasion by broom.
- Do not burn broom in native vegetation. Bushes should be removed with minimal soil disturbance.

Chemical control

- A number of herbicides are registered for use on broom in Tasmania. See Herbicides for Broom Control for more information.
- For dense stands wider than 4 to 5 metres, access paths should be cleared to allow complete coverage.
- Apply herbicide when plants are actively growing. This is generally spring to early summer, and after the autumn break.
- Young broom plants can be controlled relatively easily because of their low tolerance to herbicides. They should be controlled before they set seed, (less critical for established stands with a seed bank).
- Allow regrowth to reach 50 to 100 cm high before herbicide treatment; this ensures enough leaf area to absorb sufficient herbicide to kill the roots.
- Basal bark, drill and fill (stem injection), and cut stump applications are useful where foliar application of herbicide may cause off-target damage, for example in treating broom on riverbanks or amongst desirable shrubs and trees.
- In agricultural situations, broom bushes should be removed after spraying to facilitate the preparation of a seedbed, the sowing of pasture seed and the spot treatment of regrowth. This removal will also reduce the fire hazard created by the dead plants.
- Sprayed bushes should not be removed until full brownout has occurred (at least six months after treatment).

Appendix C – Holly Control Guide – source DPIPWE

Website Reference: https://dpipwe.tas.gov.au/invasive-species/weeds/weeds-index/declared-weeds-index/holly

Holly *(Ilex aquifolium)*

Holly Berries, photo: © Jürgen Howaldt (Wikimedia)

What is Holly?

- Holly is an invasive 'environmental' weed of forests, forest margins, riparian areas, disturbed sites, waste areas and gardens in the cooler temperate regions of Australia.
- **Holly does occur in Tasmania,** and is a **declared weed** under the Tasmanian *Weed Management Act 1999*. The importation, sale and distribution of Holly are prohibited in Tasmania.

How to identify holly?

- Holly is widely cultivated in Australia as a garden ornamental and hedging plant, with numerous cultivars available, including some without prickly leaves and others with variegated leaves.
- An upright (erect) much-branched shrub or small tree usually growing up to 10 m, or occasionally a larger tree up to 15 m in height. Holly's thick and leathery spine tipped leaves have glossy dark green upper surfaces and paler, duller undersides.
- Small pinkish-white flowers (about 8 mm across) are produced in clusters of three in the leaf forks, with separate male and female flowers borne on separate plants, ('dioecious'). Rounded berry-like fruit (7-10 mm across) turn bright red as they mature in Autumn, and are mildly poisonous to humans, causing vomiting.

- The fruit are eaten by birds and other animals which disperse the seeds into bushland, and they may also be spread in dumped garden waste. Plants can also spread laterally by suckering and layering to form dense thickets, replacing native plants and shrubs.

- Holly is also dispersed intentionally by people, being available in nurseries, garden centres, markets, and in florist shops.

- For further information or help in identifying holly, contact Biosecurity Tasmania on 03 6165 3777.

Image: Mature holly trees.

Holly in Tasmania

- Holly (*Ilex aquifolium*) is native to northern Africa, western and southern Europe, and western Asia, and now naturalised in New Zealand, western USA, Hawaii, and in much of temperate south-eastern Australia, (on the central and southern tablelands of New South Wales, Victoria, Tasmania and south-eastern South Australia).

- Tolerant of summer drought, modelling indicates very strong year-round suitability to much of Tasmania, with several known naturalised holly populations in parts of the state.

Legal status of holly in your area?

- The legal responsibilities of landholders and other stakeholders in dealing with holly are laid out in the **Statutory Weed Management Plan for Holly**.

- For details regarding distribution of holly, including whether your area falls in an eradication ('Zone A' municipality), or containment ('Zone B' municipality), refer to the Tables and information provided in Section 12, 'Management of Holly by municipality', in the **Statutory Weed Management Plan for Holly**.

See also Statutory Management Plan for Holly

Holly Control Guide

Do

- Plan your control program, this will save time and money in the long-run;
- Consider the impact of your control methods on off-target species, especially if herbicides are used;
- Ensure machinery and equipment is washed down between sites or prior to contractors leaving site;
- Get in early for new infestations, Control of mature trees is more difficult and expensive;
- Carefully time your use of herbicide for best results (see **Herbicides for Holly Control** below for more information);
- Coordinate your control program with neighbouring landholders where your weed problem crosses property boundaries;
- Revisit and regularly inspect the site and ensure follow-up is undertaken;
- Use a combination of different control methods; and
- To reduce re-infestation, restore the disturbed habitat with new plants such as native species, non-invasive garden species, vigorous pasture and/or production crops where suitable.

Don't

- Don't introduce holly to holly-free areas (e.g. by failing to wash down machinery and equipment between sites);
- Don't start your control program without first planning your approach;
- Don't allow holly to flower and set seed before treatment;
- Don't rely on one attempt at removal - follow-up is essential;
- Don't rely on just one control method;

Spread of holly

- Holly berries (with seeds) are readily carried long distances by rivers and streams, in mud and soil carried on road graders and earth moving equipment, farm machinery, vehicles, footwear, and in the digestive tracts of birds and animals.

- Berries can also be distributed via contaminated agricultural produce, garden waste dumped in bushland and roadsides, or cultivation as an ornamental plant.

- Germination of root suckers and branches can occur after some soil or vegetation disturbance including cultivation, fire, slashing, herbicide treatment, road-making, pig-digging, etc.

- Holly can also invade new areas without major disturbance via seed dispersal.

Avoiding the introduction of holly

- If cultivation must be carried out in infested areas, ensure all equipment is cleaned and checked for holly berries or seeds before moving to un-infested areas. If possible, always work un-infested areas first.

- Gravel and sand should not be removed from infested quarries and streams.

- Holly growing along access tracks must be controlled to limit spread of seed. Vehicles, bush walkers and horse riders using infested areas should keep to designated routes to avoid disturbance and spread of seed.

Physical removal

- Small seedlings can be hand pulled or grubbed when the ground is moist. They are often difficult to pull out due to strong roots. Do not hand pull if all the roots cannot be confidently removed, as they will re-sprout.

- After clearing always carry out follow up treatments, as holly when left readily regenerates forming dense thickets in moist bushland areas, seriously impacting and threatening native vegetation.

Cultivation

- Pasture improvement is an effective method of control for arable land infested with holly. Large plants can be mechanically removed, followed by repeated cultivation, cropping and/or pasture establishment and grazing.

- To reduce re-infestation in bushland, disturbed habitat can be restored with new plants such as native species and/or non-invasive garden plants.

Chemical control

- A number of herbicides are registered for use on holly in Tasmania, see **Herbicides for Holly Control** for more information.
- Apply herbicide when plants are actively growing, generally spring to early summer, and after the autumn break; however, local experience has found that holly responds well to cut and paint techniques throughout the year. For the most effective control of holly, do not treat during winter as the tree is dormant and will not take up the poison.
- Cut the shrub off at ground level and paint stump immediately with an undiluted herbicide. This is useful for larger seedlings or small shrubs that are too hard to hand pull. See **Herbicides for Holly Control** below for more information.
- Cut stump application is useful where foliar application of herbicide may cause off-target damage, for example in treating holly on riverbanks or amongst desirable shrubs and trees.
- Larger shrubs and trees can be treated by drilling holes 2-3 cm in the trunk as close to the root as possible, and filling each hole immediately with an undiluted herbicide. The tree will then slowly die and may need to be removed later. This is useful when you do not want to open a hole in the canopy by removing a large tree. Repeat treatments may be required over 12 months. See **Herbicides for Holly Control** below for more information.
- Allow regrowth to reach 50 to 100 cm high before herbicide treatment; this ensures enough leaf area to absorb sufficient herbicide to kill the roots.
- Sprayed bushes should not be removed until full brownout has occurred (at least six months after treatment).

Hobart City Council Bushcare Experience

Holly Control: Hobart City Council Bushcare Experience (by Rob Beedham)

Herbicides for Holly Control

These herbicide recommendations are made subject to the product being registered for that purpose under relevant legislation. It is the user's responsibility to check that registration or an off-label permit covers the proposed use. **Always read the herbicide label**.

If in doubt, visit the Australian Pesticides and Veterinary Medicines Authority (APVMA) website.

Only herbicides registered for use in pasture and non-cropping situations are listed in the following table. Care must be taken in using herbicides as non-target plants contacted may be harmed. For recommendations in specific crops consult an agronomist.

Wetting agents

Carefully consult the product label for specific directions regarding the use of wetting agents or adjuvants.

Waterways and wetlands

Be careful! Many herbicides can cause damage to waterways and wetlands. Check the herbicide label directions carefully before use near waterways and wetlands. For more information see Guidelines for Safe and Effective Herbicide Use Near Waterways.

Herbicide Brands and Concentrations

Herbicides are referred to by the active chemical ingredient in the following table. The product trade names in this publication are supplied on the understanding that no preference between equivalent products is intended and that the inclusion of a product does not imply endorsement by DPIPWE over any other equivalent product from another manufacturer. Information on available brands containing the herbicide you require should be obtained from a reputable herbicide supplier or the APVMA website.

There may be a number of products with the same active ingredient some with alternate formulations (concentration) registered for control of a weed eg: Glyphosate 360g/L, Glyphosate 450g/L may be registered for use on the same weed. Alternate formulations such as these will have a different application rate. **Always check the label**.

Foliar spray - spot spray, knapsack application

Herbicide (active ingredient)	**Example of commercial product** (concentration of active ingredient)	**Application rate of commercial product** (With water unless indicated)	**Withholding period**	**Comments**
Glyphosate** 360 g/L (where product has an aquatic registration)	Weedmaster Duo 360 g/L	10 -13 ml/L plus adjuvant ONLY in accordance	Not required when used as directed.	In accordance with APVMA permit PER84775.

	Roundup Biactive® 360 g/L	with label as required		For spot spraying of regrowth and seedlings. Do not treat during winter as the tree is dormant and will not take up the poison.
Glyphosate** 540 g/L (where product has an aquatic registration)	Roundup Power Max® 540 g/L	7 ml/L plus adjuvant ONLY in accordance with label as required	Not required when used as directed.	
Triclopyr 300 g/L +*Picloram 100 g/L + Aminopyralid 8 g/L*	Grazon Extra (300 g/L, 100 g/L, 8 g/L)	400 ml/100 L	Not required when used as directed.	In accordance with APVMA permit PER84775.
Metsulfuron-methyl 600 g/Kg**	Associate®, Metsulfuron 600 WG Herbicide	10-15 g/ 100 L plus wetting agent ONLY in accordance with label as required	Not required when used as directed.	In accordance with APVMA permit PER84775.

***Note:** picloram remains active in soil for extended periods and may leach into groundwater.

Drill and Fill, Cut stump and Basal bark applications

Herbicide (active ingredient)	**Example of commercial product** (concentration of active ingredient)	**Application rate of commercial product**	**Withholding period**	**Comments**
*Picloram (44.7g/L) + aminopyralid (4.7 g/L)	Vigilant II®	Apply gel undiluted 3- 5 mm thick	Not required when used as directed.	Cut stump and apply immediately. Suitable for non-crop situations.
Glyphosate 360 g/L (where product has an aquatic registration)	Weedmaster Duo 360 g/L Roundup Biactive® 360 g/L	Undiluted	Not required when used as directed.	In accordance with APVMA permit PER84775.

Triclopyr 600** g/L	Garlon TM 600	1:60 in diesel	Not required when used as directed.	For paint or cut stump techniques.

***Note:** picloram remains active in soil for extended periods and may leach into groundwater.

**These products are not registered on label for this use in Tasmania and will not be mentioned on products labels, however a permit (number - PER84775) issued by the Australian Pesticides & Veterinary Medicines Authority allows this specific use. If using this method and herbicide you will require a copy of this permit. For further information on permit details visit the APVMA website.

Appendix D –Elisha's Tears Control Guide – source DPIPWE

Website Reference: https://dpipwe.tas.gov.au/invasive-species/weeds/weeds-index/declared-weeds-index/elishas-tears

Elisha's Tears (Leycesteria formosa)

What is Elisha's tears?

- Elisha's tears is an environmental weed of wet forests, woodlands and stream-sides
- Elisha's tears is a **declared weed** under the Tasmanian *Weed Management Act 1999.* The importation, sale and distribution of Elisha's tears is prohibited in Tasmania.

How to identify Elisha's tears

- Elisha's tears (sometimes called Himalayan honeysuckle) is a deciduous, long-lived shrub growing to a height of 3 to 4 metres. Arising from a root crown just below the soil surface, the bamboo-like (hollow) stems are 2 to 4 cm in diameter and may be upright or horizontal.
- Leaves are dark green on the upper surface, paler green and lightly hairy underneath with prominent veins.
- Flowers occur in clusters of six in pendulous hanging chains. Each cream-purple, funnel-shaped flower is 1.5 cm long and tubular, and enclosed by leaf-like purple-green bracts, which are easily mistaken for the flower itself. Flowering usually occurs from late spring to summer.
- The fruit is an oval-shaped berry, 6 to 10 mm long, and reddish purple to black.

Image top: Elisha's tears flower cluster, © T. Rudman.
Image above: Elisha's tears in flower.

Elisha's tears in Tasmania

- Elisha's tears occurs in wetter forests and woodlands in Tasmania's north-east, north-west, west and south.
- Elisha's tears invades cool moist forests, woodlands and riparian (stream-side) areas. Elisha's tears can invade both disturbed and undisturbed bush, forming dense thickets that can smother other vegetation and prevent regeneration, displacing both native plants and animals.

What is the legal status of Elisha's tears in your area?

- The legal responsibilities of landholders and other stakeholders in dealing with Elisha's tears are laid out in the Statutory Management Plan for Elisha's Tears.
- Use Table 1 (Zone A municipalities) in the Statutory Management Plan for Elisha's Tears to find out whether your area falls in an eradication or containment zone.

What you need to do

If you locate Elisha's tears anywhere in Tasmania, or if you find a plant that you think could be Elisha's tears, immediately contact Biosecurity Tasmania on 03 6165 3777 to report this weed.

Detailed management and control guidelines for Elisha's tears can be found in the Elisha's Tears Control Guide. Refer also to Herbicides for Elisha's Tears Control. For further information see Weed Links and Resources.

Elisha's Tears Control Guide

Spread of Elisha's tears

- Elisha's tears reproduces by seed and stem layering.
- Mature plants can produce hundreds of fruit over summer and autumn, with each fruit containing up to 100 seeds. Seed is dispersed by birds and possibly by foxes and possums, in water, by slashing and during removal of the weed.
- Stem layering occurs where stems contact moist soil and send down roots. Dislodged fragments of stem that fall on moist soil may also regenerate. Vegetative (stem) material can be spread by slashing and during removal of the weed.

Physical removal

- Seedlings or small plants can be hand-pulled or dug out, taking care to remove any crown that has developed, as well as any layered stems.
- The material should be disposed of by burning where safe to do so, or by piling plants where they cannot layer.
- Care should also be taken to remove fruit to prevent accidental seed dispersal during disposal.
- Large plants can have extensive root systems, and digging out or mechanical removal may lead to soil erosion. Alternative control options should be considered for larger plants.

Revegation

- Elisha's tears is not killed by shading from other plants, so the establishment of competition is not an effective means of control.
- Where Elisha's tears has been removed, re-establishing native vegetation can inhibit the germination of Elisha's tears seed.
- Re-establishing native vegetation can also be useful in stabilising stream-banks after weed removal.

Chemical control

- A number of herbicides are registered for use on Elisha's tears in Tasmania. See Herbicides for Elisha's Tears Control for more information.

Appendix E – Blackberry Control Guide – source DPIPWE

Website Reference: https://dpipwe.tas.gov.au/invasive-species/weeds/weeds-index/declared-weeds-index/blackberry

Blackberry

(*Rubus fruticosus* agg.)

What is blackberry?

- Blackberry is the name used for a range of closely-related brambles. Blackberry is a serious and highly invasive environmental and agricultural weed.
- Blackberries are **declared weeds** under the Tasmanian *Weed Management Act 1999.* The importation, sale and distribution of blackberry are prohibited in Tasmania.
- Blackberry is also a Weed of National Significance (WONS).

Important Note - Do not apply any herbicides to blackberry plants that are carrying fruit.

How to identify blackberry

- Blackberries are spiny, perennial (long-lived) shrubs with trailing stems which can produce dense thickets. The canes may be erect, arching or trailing and they can reach

6 m in length. Blackberries thickets can reach two or more meters in height and cover many square meters in area.

- Blackberries are relatively straightforward to identify. However, if you are in doubt about the weed you are dealing with, contact Biosecurity Tasmania on 03 6165 3777 for help.

Image top: Blackberry fruit, © Kiowa Fenner, DPIPWE
Images above, left to right: Blackberry and early fruit, © Kiowa Fenner, DPIPWE; White blackberry flowers, © Marty Bower, West Coast Weed & Fire Management Group; Blackberry maturing fruit, © Kiowa Fenner, DPIPWE

Blackberry in Tasmania

- Blackberries occur in all settled areas of Tasmania. Blackberries prefer open situations and occur as a weed in disturbed bush, along stream-sides, roadsides, tracks and fence lines, and in degraded pasture and neglected areas.

- Severe infestations of blackberry on farmland can effect agricultural production and reduce access to water and land. Blackberry is also an important weed of disturbed and degraded native vegetation, particularly along stream-sides. Blackberries can also pose a significant fire hazard and provide a haven for vermin.

What is the legal status of blackberry in your area?

- The legal responsibilities of landholders and other stakeholders in dealing with blackberry are laid out in the Statutory Weed Management Plan for Blackberry.
- Use Table 1 (Zone A municipalities) and Table 2 (Zone B municipalities) in the Statutory Weed Management Plan to find out whether your area falls in an eradication or containment zone.

Detailed management and control guidelines can be found in the Blackberry Control Guide. Refer also to Herbicides for Blackberry Control. For further information see DPIPWE's Weed Links and Resources.

Blackberry Control Guide

Do

- Plan your control program, this will save time and money in the long-run;
- Consider the impact of your control methods on off-target species, especially if herbicides are used;
- Ensure machinery and equipment is washed down between sites or prior to contractors leaving site;
- Get in early - For new infestations, eradicate before the plants reach the flowering stage: once plants begin seeding, control becomes more difficult and expensive;
- Carefully time your use of herbicide for best results (see Herbicides for Blackberry Control for more information);
- Coordinate your control program with neighbouring landholders where your weed problem crosses property boundaries;
- Revisit and regularly inspect the site and ensure follow-up is undertaken; and
- Use a combination of different control methods.

Don't

- Don't introduce blackberry to blackberry-free areas (e.g. by failing to wash down machinery and equipment between sites);
- Don't start your control program without first planning your approach;
- Don't allow blackberry to flower and set seed before treatment;

- Don't rely on one attempt at removal - follow-up is essential;
- Don't rely on just one control method;
- Never burn blackberry without follow up treatment of regrowth; and
- Do not burn blackberry in native vegetation.

Spread of blackberry

- Blackberry fruits are eaten by many birds and animals which then spread the seed. The seeds survive in the droppings and can be transported large distances from the parent bush. Blackberry seed is also spread by water in creeks and rivers.
- The canes of blackberries are also able to send out roots at the tip where they touch the ground, allowing uncontrolled patches of blackberries to cover large areas. Blackberries will also grow from root suckers and root fragments.

Physical removal

- Physical removal by repeated slashing may limit the spread of blackberries but it is not an effective method of control when used alone. Blackberry will regenerate from root suckers, and whole canes growing along the ground will often be missed by the slasher blades.

Cultivation

- Competition from well managed pasture will help prevent the establishment and spread of blackberries on grazing land.
- Where machinery can be used, established blackberry thickets can be dozed out and the area deep-cultivated to destroy the root system. Repeated cultivation is necessary to destroy seedlings and regrowth before the area is sown to pasture or crop.
- Seedlings and regrowth from root fragments can also be sprayed for one or two seasons after physical removal.

Burning

- Large infestations of blackberry can be removed by burning. However, follow-up treatment of regrowth by herbicide, grazing or cultivation is essential.
- Blackberry thickets pose a fire risk and care should be taken in burning blackberry near native or other valuable vegetation, fences and buildings.

Grazing

- Goats readily eat blackberries and are capable of destroying large infestations.
- Sheep are useful to some extent in the control of blackberries because they eat seedlings and young tip growth.

Biological control

- Biological control is the use of a living species, usually an insect, mite or disease, to control a weed;
- Biological control will not eradicate blackberry, but may be used in conjunction with other control methods;
- Biological control agents for blackberry that have been released in Tasmania include the Blackberry leaf rust fungus.
- For more information on biological control programs in Tasmania contact the Tasmanian Institute of Agriculture.

Chemical control

Important Note - Do not apply any herbicides to blackberry plants that are carrying fruit.

- A number of herbicides are registered for use on blackberry in Tasmania. See Herbicides for Blackberry Control for more information.
- Herbicide spraying of blackberries works best when carried out in the period from petal fall to leaf fall, usually from December to May.
- For all herbicides, complete coverage of all canes and leaves is essential, including those growing from suckers away from the main bush.
- Regrowth after slashing, burning, or grazing should be at least 50 cm high before herbicide application.

Appendix F –Gorse Control Guide – source DPIPWE

Website Reference: https://dpipwe.tas.gov.au/invasive-species/weeds/weeds-index/declared-weeds-index/gorse

Gorse (Ulex europaeus)

What is gorse?

- Gorse is a serious agricultural and environmental weed.
- Gorse is a declared weed under the Tasmanian *Weed Management Act 1999*. The importation, sale and distribution of gorse are prohibited throughout Tasmania.
- Gorse is also a Weed of National Significance (WONS).

How to identify gorse

- Gorse is a prickly evergreen shrub which may grow to a height and diameter in excess of 3 metres. All the stems and leaves end in a sharp spine. Gorse flowers are bright yellow pea-like flowers, and are borne all over the plant. The buds develop during February and March, although flowering tends to occur in spring and autumn. Gorse bears large quantities of brown to black seed in grey, hairy pods.
- Gorse is relatively straightforward to identify. However, you can search the Dennis Morris Weeds and Endemic Flora database for gorse illustrations. If you are still in doubt about the weed you are dealing with, contact Biosecurity Tasmania on 03 6165 3777 for help.



Images top & above left: gorse flowers.

Images above centre & right: gorse invading river bank & bushland.

Gorse in Tasmania

- Gorse is widely distributed in Tasmania and is found in most municipalities. The exceptions are a handful of north-eastern and south-eastern municipalities and the Bass Strait Islands which have relatively small, localised populations of gorse.
- Gorse is a major agricultural weed, and serious infestations of pasture can dramatically reduce stocking rates. Gorse is also a threat to many natural environments such as forests, woodlands, riparian (stream-side) vegetation, wetlands and native grasslands. Other impacts of gorse include providing shelter for pest animals, and an increased risk of bushfires.

What is the legal status of gorse in your area?

- The legal responsibilities of landholders and other stakeholders in dealing with gorse are laid out in the Statutory Management Plan for Gorse. Use Attachment 1 in the Statutory Weed Management Plan to find out whether your area falls in a **Zone A** municipality (management objective is **eradication** of gorse) or a **Zone B** municipality (management objective is **containment** of gorse).

Detailed management and control guidelines for gorse can be found in the Gorse Control Guide. Refer also to Herbicides for Gorse Control. For further information contact the Department's Weed Management Section.

Gorse Control Guide

Do

- Plan your control program, this will save time and money in the long-run;

- Use a combination of different control methods;
- Consider the impact of your control methods on off-target things, especially if herbicides are used;
- Ensure machinery and equipment is washed down between sites or prior to contractors leaving site;
- Revisit the site and use follow-up treatments over at least 5 years;
- Coordinate your control program with neighbouring landholders where your gorse problem crosses property boundaries;
- For large infestations, tackle the smaller, outlying patches first. The larger infestation can be tackled later.

Don't

- Don't introduce gorse to gorse-free areas (e.g. by failing to wash down machinery and equipment between sites);
- Don't start your control program without first planning your approach;
- Don't rely on just one control method;
- Don't rely on one attempt at removal - follow-up is essential;
- Never burn gorse without follow up treatment of regrowth;
- Don't burn gorse in or next to native vegetation.

Spread of gorse

- Gorse reproduces by seed; each plant produces huge numbers of seeds with a water-resistant coating which allows them to remain dormant in the soil for up to 30 years.
- Seeds are usually released in hot or dry conditions but can be stimulated into germination following burning or mechanical disturbance. Most seeds fall around the parent plant but the pods can split open and shoot seeds for a distance of up to 5m, allowing infestations to spread rapidly.
- Gorse can also spread from seed movement in water, soil, machinery and footwear. Individual gorse bushes can live for up to 30 years.
- See the Washdown Guidelines for Weed and Disease Control for detailed information on how to wash-down equipment and personnel to reduce the chance of spreading gorse.

Avoiding the introduction of gorse

- Preventing the introduction of gorse to gorse-free areas is the best means of control. Good machinery and equipment hygiene-practices are vital.

- Gorse seed is usually carried into new areas in soil and mud attached to machinery or boots. Gorse seed is too heavy to be dispersed by wind, and birds are not important in spreading seed.

- Gorse seed can also be carried in water. Removing gorse bushes on the edges of water courses is important in preventing dispersal of seed downstream.

Physical removal

- Physical removal of gorse will not control an infestation unless it is combined with other methods of follow-up control. Regular slashing or mowing by themselves are NOT effective in eradicating gorse because plants will regrow from cut stumps or dormant seed in the soil as soon as slashing ceases.

Cultivation

- Mechanical clearing is an ideal method of controlling large infestations on land that is later sown down with a competitive pasture species. This treatment may require targeted herbicide spraying of regrowth and a second subsequent sowing of pasture.

- Avoid causing unnecessary disturbance to the soil, and avoid using heavy machinery along creeks and rivers.

- Follow-up management is vital. This includes establishment of a vigorous pasture, grazing of gorse seedlings, and herbicide use on plants surviving grazing.

Burning

- Frequent burning of gorse without follow-up will lead to increased germination of seed and more gorse. Burning should ONLY be used in conjunction with other control methods.

- Burning is useful for removing large stands of gorse and making follow-up spraying more effective. Fire destroys large amounts of seed and stimulates much of the remaining seed to germinate, so that the seedlings can be sprayed the following year, greatly reducing the seed in the soil.

- Burning can be useful several months after spraying of an infestation as it reduces the dead stems to ashes.

- Burning can be useful when combined with grazing by sheep or goats. Burning will reduce the amount of mature (and unpalatable) foliage and stems of older bushes, as well as stimulating the growth of seedling-shoots which are more palatable to grazing animals.

- Gorse burns readily and gorse fires may cause severe damage to adjacent bush. Extreme care should be taken when burning gorse near native vegetation, fences or buildings. Gorse growing underneath high voltage power lines should not be burned without consulting the power company.

Grazing

- Grazing can be useful when combined with other control methods such as burning and herbicide, but is usually not effective on its own at eradicating gorse.

- Grazing by sheep is only moderately effective at controlling regrowth gorse seedlings. Sheep will browse gorse bushes during spring or when pasture feed is in short supply. However, sheep prefer pasture to gorse, and control of established plants cannot be achieved by sheep grazing alone.

- Goats prefer to browse young gorse shoots rather than pasture. However well established gorse bushes are not readily killed by goat browsing alone, and will recover when the goats are removed.

- One strategy is to burn mature gorse bushes, then stock with goats supported by large numbers of sheep during spring and early summer to reduce pasture carry-over. Reducing pasture carryover into late summer/autumn by sheep-grazing in the spring means that goat browsing pressure can be maintained on the gorse bushes throughout the growing season.

Biological control

- Biological control is the use of a living species, usually an insect, mite or disease, to control a weed;

- Biological control will not eradicate gorse, but can be used in conjunction with other control methods;

- Biological control agents that have been released in Tasmania include the gorse seed weevil, gorse spider mite, and gorse thrips.

- These gorse control agents can be released into heavy infestations to reduce the vigour and abundance of the gorse to assist with other control methods as part of an integrated management program.

Chemical control

- A number of herbicides are registered for use on gorse in Tasmania. See Herbicides for Gorse Control for more detailed information.

Sensitive environments

There are a number of sensitive environments where gorse often occurs, and care is needed in selecting the control method in these environments:

Creeks, rivers and wetlands

- Consider using non-herbicide methods for gorse along waterways and in wetland areas as chemicals can have significant off-target effects in these environments.
- If there is no alternative, then ensure that the appropriate herbicide and application techniques are used.
- Avoid using heavy machinery that may cause damage to stream-banks and trigger erosion.
- Gorse control along rivers should be done in conjunction with stock control and revegetation.
- For more advice, contact Biosecurity Tasmania on 03 6165 3777.

Native bushland

- Avoid clearing with heavy machinery and burning for controlling gorse infestations in native bushland.
- Re-vegetate with local native species.

Integrated management of gorse

In most situations, the most effective control of gorse will be achieved by a combination of the above methods rather than using a single method. To maximise the chance of successfully eradicating an infestation, it is imperative that after removing or spraying gorse the site is monitored for regrowth over several years, and any regrowth is dealt with by follow-up control.

Agricultural land

In agricultural situations, herbicide application, burning, mechanical removal, pasture establishment and goat and sheep grazing can be combined successfully.

In most agricultural situations gorse bushes should be removed after spraying to facilitate the preparation of a seedbed, the sowing of pasture seed and the herbicide treatment of regrowth. Removing the dead gorse will also reduce the fire hazard created by the dead bushes. Sprayed bushes should not be removed until full brownout has occurred. Burning the dead gorse is also an effective way to reduce the seedbank prior to re-sowing.

Wasteland areas

In wasteland areas such as gullies and rocky banks where pasture establishment is impractical, spraying or cut-stump treatment with repeated follow-up treatment are the most effective ways of preventing reinfestation. In these areas, grazing should be restricted to prevent soil disturbance and encourage the natural regeneration of grasses and other plants to compete with gorse seedlings.

Bushland areas

For bushland areas, mechanical methods (chainsaw, brushcutter), herbicide application (cut stump treatment) and revegetation can be combined to control gorse with minimal damage to surrounding vegetation. Removal by burning will encourage the germination of gorse and other weeds which will rapidly cover bare areas left after the fire. Therefore, dead gorse bushes should be removed by other means with minimal soil disturbance. In the case of wildfire in bushland, areas known to have had gorse should be inspected for treatment of germinating gorse seeds following the fire.

Appendix H: Wattle Control Measures

Source: Weeds in Your Bush, DPIPWE https://dpipwe.tas.gov.au/Documents/kit3a.pdf

Wattles (*Acacia baileyana, A. decurrens, A. longifolia* ssp. *longifolia, A. pycnantha, A. paradoxa*)

Most of the wattles that are weeds in Tasmania are mainland Australian native species so they are well-adapted to survival in the bush. They generally produce large quantities of seed that build up to a significant seedbank and germinate after fire.

Control methods

Hand-pulling: Seedlings and smaller plants can be hand-pulled.

Burning: Larger plants can be killed or reduced to ground level by fire,

which also stimulates the germination of seed stored in the soil.

Ringbarking: This should be done as close as possible to the ground to

stop re-shooting.

Herbicides: The table below shows the herbicides suitable for control

of wattles. Do not apply herbicides if the plants are under stress.

Type of application	Herbicide (active ingredient)	Commercial products (concentration of active ingredient)	Application rate	Comments
Foliar spray	Triclopyr + picloram	Grazon DS® (triclopyr 300 g/ L + picloram 100 g/ L	5 ml/ L	
	Triclopyr	Garlon 600® Blackberry & Tree Killer® Tree Killer®	<2 m tall - 1.7 ml/ L or >2 m tall - 3.3 ml / L	
Cut and paint	Triclopyr + picloram	Access® (triclopyr 240 g/ L + picloram 120 g/ L)	Mix in diesel: 17 ml / L diesel. Consult weed officer about use of water to mix.	Cut close to the ground and apply immediately after cutting & on stem, may also be applied as basal bark spray

Note: Adding other products to most herbicides alters their effectiveness. Carefully consult the labels for specific directions before adding any other products.

Appendix I: Fennel Control Measures

Source: DPIPWE

https://dpipwe.tas.gov.au/invasive-species/weeds/weeds-index/declared-weeds-index/fennel

Fennel

(*Foeniculum* *vulgare*)

What is fennel?

- Fennel is a significant weed of open, exposed sites like roadsides, railways, wastelands, channels and drains which receive abundant water or runoff. Fennel is also grown as a commercial crop in Tasmania.
- Fennel is a **declared weed** in Tasmania under the Tasmanian *Weed Management Act 1999*. The importation, sale and distribution of fennel are prohibited in Tasmania.

How to identify fennel

- Fennel is a perennial (long-lived) herb with a stout branched taproot, jointed stems and feathery leaves that smell like aniseed. Fennel typically grows to between 1.5 to 2 metres high.
- Flowering stems are produced from the centre of the plant each spring bearing an umbrella of small greenish yellow flowers. Aromatic seeds replace the small flowers at the ends of the flowering stems in summer and autumn.
- For further help in identifying fennel, search the Dennis Morris Weeds and Endemic Flora database for fennel illustrations. If you are still in doubt about the weed you are dealing with, contact Biosecurity Tasmania on 03 6165 3777 for help.

Fennel in Tasmania

- Fennel is a common roadside weed in Tasmania, and is also found along creek lines and streams and in waste areas receiving moderate rainfall or run-off. Significant infestations of fennel occur at Orielton Lagoon, around Glenorchy, and at Devonport.
- Once well established fennel excludes most other plants, possibly due to the plant's unusual chemical properties.
- Whilst fennel is a weed, the plant also has many useful attributes and has long been used as a vegetable and for its medicinal qualities. Trash resulting from harvesting of commercial crops is also used as garden mulch.

What is the legal status of fennel in your area?

- The legal responsibilities of landholders and other stakeholders in dealing with fennel are laid out in the Statutory Management Plan for Fennel.
- Use Table 1 (Zone A municipalities) and Table 2 (Zone B municipalities) in the Statutory Management Plan for Fennel to find out whether your area falls in an eradication or containment zone.

Detailed management and control guidelines for fennel can be found in the Fennel Control Guide. Refer also to Herbicides for Fennel Control. For further information see DPIPWE's Weed Links and Resources.

Fennel Control Guide

Do

- Plan your control program, this will save time and money in the long-run;
- Consider the impact of your control methods on off-target species, especially if herbicides are used;
- Ensure machinery and equipment is washed down between sites or prior to contractors leaving site;
- Get in early - For new infestations, eradicate before the plants reach the flowering stage: once plants begin seeding, control becomes more difficult and expensive;
- Carefully time your use of herbicide for best results (see Herbicides for Fennel Control for more information);

- Coordinate your control program with neighbouring landholders where your weed problem crosses property boundaries;
- Revisit and regularly inspect the site and ensure follow-up is undertaken;
- Use a combination of different control methods; and
- Establish vigorous pasture (or native species) after removal to reduce re-infestation.

Don't

- Don't introduce fennel to fennel-free areas (e.g. by failing to wash down machinery and equipment between sites);
- Don't start your control program without first planning your approach;
- Don't allow fennel to flower and set seed before treatment;
- Don't rely on one attempt at removal - follow-up is essential;
- Don't rely on just one control method.

Spread of fennel

- Fennel is spread mainly by seed. Fennel seed falls to the ground very near the parent plant.
- Longer-distance movement of seed occurs where seeds contaminate agricultural produce, machinery, animal skins and human clothing. Seeds are also spread in water along drainage lines.
- Fennel can regrow from crown and root fragments. Spread occurs when crown or root fragments are moved by cultivation or earth-moving machinery.

Avoid the introduction of fennel

- Avoid introducing fennel seed or root fragments into clean areas, or into areas from which the weed is being eradicated.
- Implements and vehicles which have been used on infested areas should be thoroughly cleaned before leaving the site.
- See the Washdown Guidelines for Weed and Disease Control for detailed information on how to wash-down equipment and personnel to reduce the chance of spreading fennel.

Physical removal

- Fennel can be grubbed out, but all root material needs to be removed to stop re-sprouting from root fragments.
- Slashing can be used before and over the flowering period to reduce fennel seeding.

Chemical control

- A number of herbicides are registered for use on fennel in Tasmania. See Herbicides for Fennel Control for more information.

Compliance with the *Fennel – Statutory Weed Management Plan* is required. Refer to website address for a copy of the Plan, at

https://dpipwe.tas.gov.au/Documents/Fennel_WMP_2011.pdf

Appendix J: Wash Down Procedure

Wash Down Procedure

All construction vehicles and machinery must be washed down and disinfected to prevent the introduction of weeds, Chytrid fungus, Phytophthora, or other pathogens, prior to entering the site, in accordance with the Tasmanian Washdown Guidelines for Weed and Disease Control (DPIPWE 2004). Washdown procedures will include the following:

Vehicles will be separated into two classes – light vehicles which are not expected to undertake any construction activity and will not access weed infested parts of the site, and heavy vehicles involved in construction:

Light Vehicles – A secure car parking area will be established for light vehicles which are not involved in construction work. This will be a roped off area, covered by road base material with direct access to the carriageway and no access to the remainder of the site, therefore limiting the potential for movement of weeds to/from the area. In the unlikely event that a light vehicle arrives to site with mud or potential weed material from another area, this vehicle will be washed down at the heavy vehicles washdown facility outlined below; and

Heavy Vehicles – A temporary washdown station will be established for high pressure washdown of any plant (e.g. excavators, cranes) prior to entering or exiting the site. All heavy machinery involved in site construction will pass through this area and undergo washdown and inspection prior to entry/exit from the site.

Vehicles, machinery and personnel must be clean when entering or leaving the site, and will be inspected according to the checklist in Appendix A and cleaned if necessary prior to site entry or exit;

Chemicals, such as Phytophthora Clean ™, will be used in the washdown process to avoid the likelihood of introducing Phytophthora cinnamomi (root rot pathogen) to the site;

Where temporary sediment control is required, silt fences will be utilised; and Upon completion of washdown, an appropriate checklist, such as that shown in Appendix B, will be completed by a suitably qualified person appointed by Australian Hualong, and records maintained for auditing purposes.