Weed and Disease Planning and Hygiene Guidelines

Preventing the spread of weeds and diseases in Tasmania.

Invasive Species Branch

Department of Primary Industries, Parks, Water and Environment

Tasmanian Government

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For further details, refer to www.egovernment.tas.gov.au

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Table of Contents

1. Introduction

The *Weed and Disease Planning and Hygiene Guidelines* are a tool to provide guidance to those undertaking developments in Tasmania that may result in the introduction, spread and establishment of weeds and diseases. These guidelines aim to ensure that effective management programs are developed that consider and mitigate weed and disease risk.

Weeds and diseases are a serious threat to our environment, agriculture and community. Weeds alone cost Australians more than $4 billion dollars every year, not including the impacts to natural assets and the environment. These guidelines are an important and necessary tool to assist in the protection of Tasmania's sustainable productive capacity and natural ecosystems.

The guidelines aim to:

- Improve weed and disease management planning in Tasmania.
- Increase the number of industry based plans covering weed and hygiene management that are being implemented.
- Improve weed and disease hygiene practices at the planning and operational level.
- Provide the necessary tools to allow for effective and informed planning tailored to the situation.

In the context of these guidelines:

A **'weed'** is considered a plant (or plant like organism e.g. algae) that requires some form of action to reduce its harmful effects on the environment, economy, human health and/or amenity.

A **'pathogen'** is a living microorganism such as bacterium, virus or fungi that causes diseases in plants and animals. Examples include cinnamon fungus (*Phytophthora cinnamomi*), myrtle rust (*Puccinia psidii*), fire blight (*Erwinia amylovora*) and chytrid fungus (*Batrachochytrium dendrobatidis*).

'Developments' or **'works'** are those activities that may result in disturbance to the land, including major development projects, subdivisions, road construction, quarries, and infrastructure construction for irrigation, dams, power, telecommunication and water supply. These developments can occur on either public or private land.

'Other activities' are those that may be smaller in scale and result in potentially less disturbance to the landscape but still pose some level of risk in relation to the introduction, spread and establishment of weeds and diseases. The consequences of such activities can still be significant. 'Other activities' include:

- movement of machinery and vehicles,
- agricultural and forestry practices,
- parks and reserve maintenance,
- land rehabilitation
- road and utility maintenance,
- transport of stock, soil or other quarry materials,
- scientific research and monitoring programs and visiting remote areas where access is limited to boat, helicopter or light aircraft.

Who are these guidelines and templates designed for?

These guidelines are applicable to:

- State and local government authorities responsible for review and assessment of development projects,

- Developers and consultants responsible for producing a Development Proposal and Environmental Management Plan (DPEMP) and / or a Construction and Environmental Management Plans (CEMP).

Industry has an important role in preventing the introduction and spread of weeds and diseases. Contractors and other operational staff can reduce the impacts of weeds and diseases by implementing effective machinery and equipment hygiene practices.

These guidelines can be used to inform a range of other land managers in planning works or activities that involve the potential introduction, spread and establishment of weed and diseases. This includes State Government Reserve Activity Assessments (RAAs), local government planning and approvals, community weed management plans and property based management plans.

Related Documents

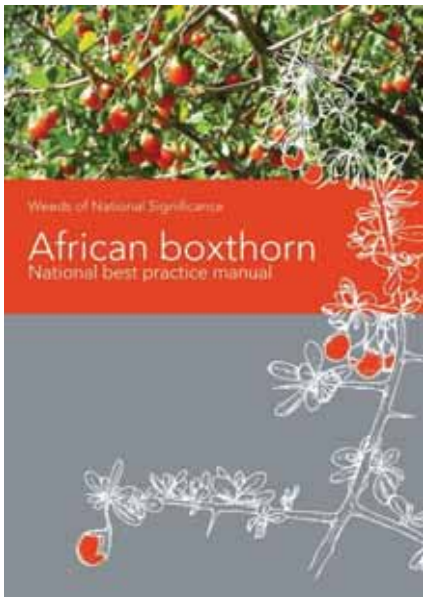
***Keeping it Clean* – A Tasmanian field hygiene manual to prevent the spread of freshwater pests and pathogens**.

This manual provides information on how to prevent the spread of freshwater pests and pathogens in Tasmanian waterways, wetlands, swamps and boggy areas. It is intended primarily for people who work in these areas, but will also help recreational visitors to understand the risks and act accordingly.

The manual complements these guidelines, which covers a broader of range of situations (terrestrial and freshwater) and is principally targeted at developments.

***Weeds of National Significance* (WoNS) best practice manuals**

Best practice manuals have been produced for the majority of WoNS species (e.g. African boxthorn). These manuals provide information on the ecology and biology of the weed, planning, general information on management and control and case studies. Whilst some of the best practice manuals relate to species not present in Tasmania, they still contain information that may be useful for a particular development, such as with aquatic weeds.



These guidelines relate to you if:

You are producing a DP&EMP*

Weeds have been identified as an issue and there is a requirement to:

- Identify declared and significant environmental weeds.
- Identify initial weed management issues.
- Recommend hygiene protocols relevant to the development.

Disease has been identified as an issue and there is a requirement to:

- Identify diseases and pathogens.
- Identify initial disease and pathogen issues.
- Recommend hygiene protocols relevant to the development

You are producing a CEMP*

Required to develop a weed and disease management plan.

- Prepare detailed information about presence and distribution.
- Prepare detailed information on control and management.
- Communicate information to site managers, contractors and other staff.

Required to develop a weed and disease hygiene plan.

- Prepare detailed information about hygiene issues.
- Prepare detailed hygiene protocols.
- Communicate information to site managers, contractors and other staff.

You are producing a plan for a property, business or local area.

Do you manage a quarry or topsoil and gravel business, and need to:

- Identify weed and disease issues within the business footprint.
- Develop a weed management and weed hygiene plan.
- Implement a control program for declared and environmental weeds.
- Quarantine areas or material that is infected with pathogens such as phytophthora
- Provide cleandown equipment.
- Maintain a log detailing destination of soil, gravel and sand.

Are you developing a property management plan, and need to:

- Identify declared and significant environmental weeds.
- Map identified weeds and important agricultural assets or environmental values.
- Develop management and control prescriptions.
- Develop a hygiene plan for the property addressing the movement of vehicles, machinery and materials.
- Implement a control program and hygiene plan and monitor success

Are you developing a local area weed management plan, and need to:

- If working on public land seek the necessary permissions.
- Identify and map weed and disease issues.
- Seek advice on appropriate control and management options.
- Develop weed management and hygiene plan.
- Implement plan and monitor outcomes.

***DP&EMP = Development Proposal and Environmental Management Plan**

***CEMP = Construction and Environmental Management Plan**

2. Legislative Responsibilities

The following section describes the relevant legislation and codes of practice relating to the control, management and use of declared weeds, and risks associated with the spread of pathogens.

Relevant government policy, legislation and codes of practice

Weed Management Act 1999

The *Weed Management Act 1999 (*WMA*)* is the primary legislation relating to weeds in Tasmania. The legislation provides for the control and eradication of declared weeds to minimise the deleterious effects of weeds on the sustainability of Tasmania's productive capacity and natural ecosystems. The WMA and other *Acts* mentioned can be viewed at the Tasmanian Legislation Online website - http://www.thelaw.tas.gov.au

Sections 56 and 57 (see box on next page) of the WMA are particularly relevant to developments and the potential risk of spreading declared weeds – with 56(1c) and 56(1g) being the most relevant. Section 57 applies to anyone intending to bring machinery or equipment into Tasmania that might be used on developments.

Permits (*Weed Management Act*) –

A permit may be required in order to undertake a specific activity that may contravene the WMA, for example transporting declared weeds for disposal. DPIPWE can issue permits and these will be assessed and issued on a case by case basis incorporating any relevant conditions.

Each declared weed has a statutory weed management plan that details the regulatory framework for the control and eradication of that weed under the WMA. The plans identify zones (containment or eradication) and industry specific hygiene measures that should be implemented in relation to a particular species. For example, hygiene and weed management requirements for aquatic weeds are different to those weeds that may be spread through stock feed. Copies of the statutory weed management plans can viewed via the Weeds Index on the DPIPWE web site at http://www.dpipwe.tas.gov.au/weeds

Those involved in developments or other activities have a responsibility to take measures to ensure that any declared weeds present on the site are controlled and that such weeds are not spread further within or off the site. For example, when introducing material such as gravel and soil to a site, all measures must be taken to ensure that this material is free of any weed propagules. These guidelines will be useful in providing instruction to prioritise the management of declared weeds.

Section 3 has further information about declared weeds.

Seeds Act 1985

The *Seeds Act 1985* lists a range of prohibited seeds and regulates and controls their production, supply and sale. It also provides for the testing of seed lots for contamination.

56. Sale, purchase, propagation, use, & c., of declared weed prohibited

(1) A person must not –

- **(a)** sell a declared weed or any material or thing containing or carrying a declared weed; or
- **(b)** purchase or offer to purchase a declared weed or any material or thing containing or carrying a declared weed; or
- **(c)** grow, propagate or scatter a declared weed; or
- **(d)** store a declared weed or any material or thing containing or carrying a declared weed; or
- **(e)** hire or offer for hire any material or thing containing or carrying a declared weed; or
- **(f)** use a declared weed or any material or thing containing or carrying a declared weed; or
- **(g)** deal with a declared weed or any material or thing containing or carrying a declared weed in any manner that is likely to result in the spread of the declared weed.

57. Importation of declared weed

(1) A person must not import or allow to be imported into Tasmania any declared weed.

(2) A person must not import or allow to be imported into Tasmania, otherwise than in accordance with any prescribed measures, any feed grain for animals that may be carrying a declared weed.

(3) A person must not import or allow to be imported into Tasmania, otherwise than in accordance with any prescribed measures, any livestock that may be carrying a declared weed.

Plant Quarantine Act 1997

The *Plant Quarantine Act 1997* (PQA) provides for the border control of plants, pests and diseases that are prohibited from entry into Tasmania. Inspections and surveillance to ensure compliance with the *Act* are undertaken by Biosecurity Tasmania at all points of entry into Tasmania. This includes the clearance of passengers, cargo, mail, plants/plant products, animals/animal products, aircraft and ship waste.

Those bringing in vehicles, machinery and materials into the State are to ensure that there is no contamination by a weed, pest or disease prohibited under the PQA. Lists of all pests and diseases prohibited under the PQA are published in the Plant Biosecurity Manual which is updated regularly and available on the DPIPWE Biosecurity Tasmania website. Weed species declared under the *Weed Management Act 1999* are duplicated in the PQA manual.

Permits (eg *Land Use & Planning Appeals Act 1993*, *Environmental Management and Pollution Control Act 1994*)

Environmental pathogens are not specifically covered under legislation. However, the regulator, at State or local government level may require as a permit condition that an assessment to identify the presence or the risk of introduction of a pathogen is undertaken. The permit may also require actions to mitigate any introduction or spread to be developed.

Industry Codes of Practice

You may also need to refer to a Codes of Practice or standard operating procedures for the relevant industry. These prescribe the manner in which certain activities should be conducted so as to protect the environment. Examples include: the Forest Practice Code (2000), Quarry Code of Practice (1999) and Mineral Exploration Code of Practice (2012).

3. Weeds, Diseases and Pathogens – Key Issues

Declared weeds

A declared weed is a plant species that has been listed under Tasmania's *Weed Management Act 1999*. There are currently 115 species listed.

Not all declared weeds are present in Tasmania. There are species that have been assessed as having the potential to cause harm to Tasmania's environment and agricultural productivity if they were to establish in the State. Such species are known on the mainland and could easily be introduced to the state through contaminated vehicles and machinery and feed and fodder. Some examples include creeping knapweed *(Acroptilon repens),* silver-leaf nightshade (*Solanum elaeagnifolium*) and heliotrope *(Heliotropium europaeum).* Additionally, some of the weeds are declared as part of national agreements to limit the sale and trade of species between states.

Some of the declared weeds are naturalised and limited in their distribution within the State. There is an opportunity to eradicate or reduce the future impact of these weeds. These weeds are regarded as high priorities for control and include Chilean needle grass (*Nassella neesiana*), cut-leaf nightshade (*Solanum triflorum*), African feather grass (*Pennisetum macrourum*) and orange hawkweed *(Pilosella aurantiaca).*

Around a third of the declared weeds are present across the state in varying degrees of density. Some examples include Spanish heath *(Erica lusitanica),* gorse *(Ulex europaeus),* Californian thistle *(Cirsium arvense)* and ragwort *(Senecio jacobaea).* There are areas in the state, such as the World Heritage Area, national parks, reserves and conservation areas and agricultural areas where many of these species are not present. Effective weed hygiene practices are important to ensure that such species are not spread further and allowed to establish in new areas.

A list of the declared weeds can be found at http://dpipwe.tas.gov.au/invasive-species/weeds/weeds-index/weeds-index-declared-weeds

Cut-leaf nightshade

Bathurst burr

Ragwort

Paterson's curse

St Johns wort

Spanish heath

Gorse

Nodding thistle

Variegated thistle

Cotton thistle

African feather grass

Serrated tussock

Chilean needle grass

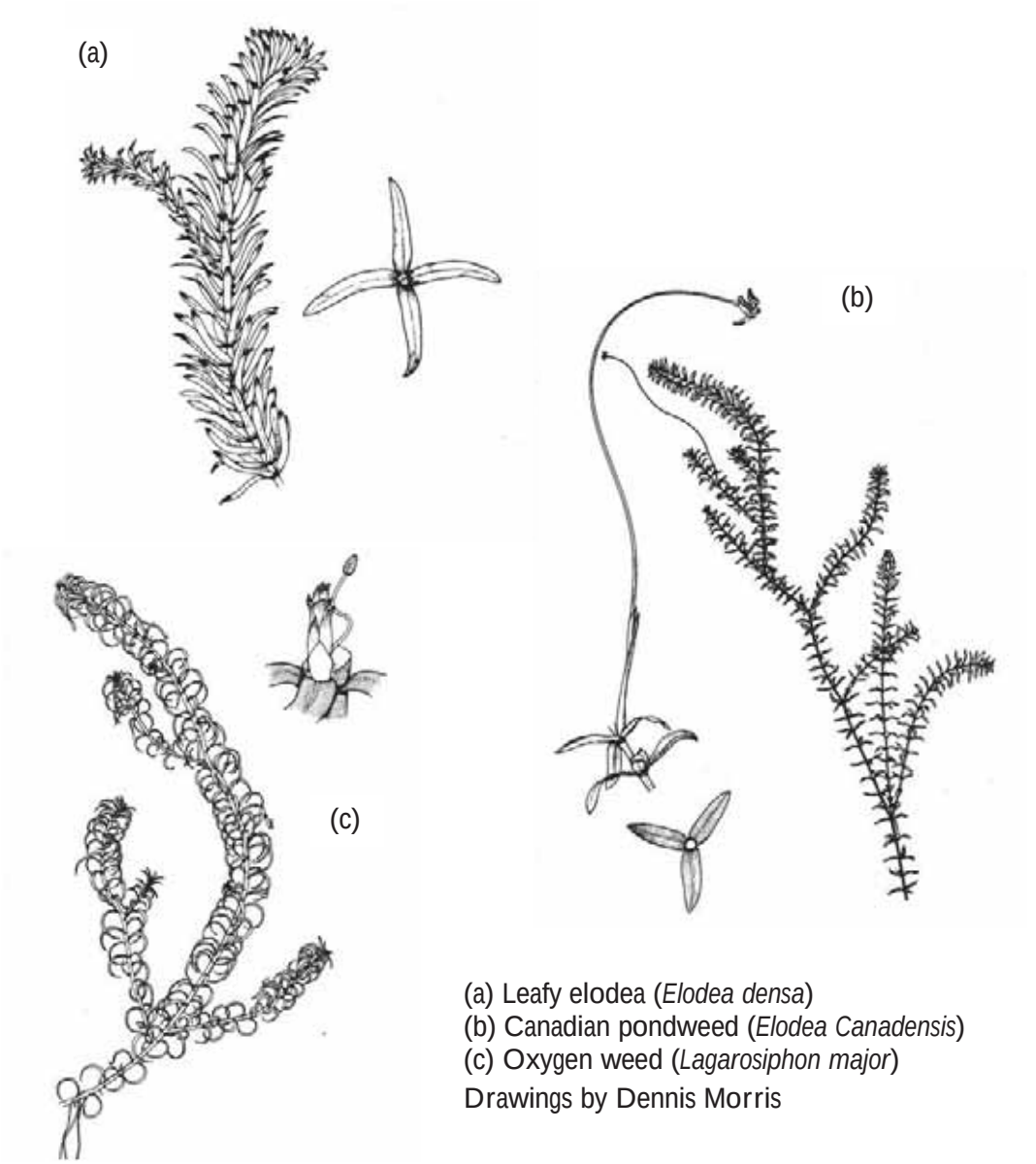
Aquatic weeds

Tasmanian rivers are relatively free of serious aquatic weed problems. Two aquatic plants, the common Canadian pondweed (*Elodea canadensis)* and less common parrot's feather (*Myriophyllum aquaticum*) are found in Tasmania. However there are a number of other aquatic weeds that cause problems on the Australian mainland and in New Zealand that are currently not known to occur in Tasmania, but if introduced could become serious problems. These include hydrilla (*Hydrilla verticillata*), Brazillian waterweed (*Egeria densa*) and lagarosiphon (*Lagarosiphon major*). All are declared under the Tasmanian *Weed Management Act 1999*.

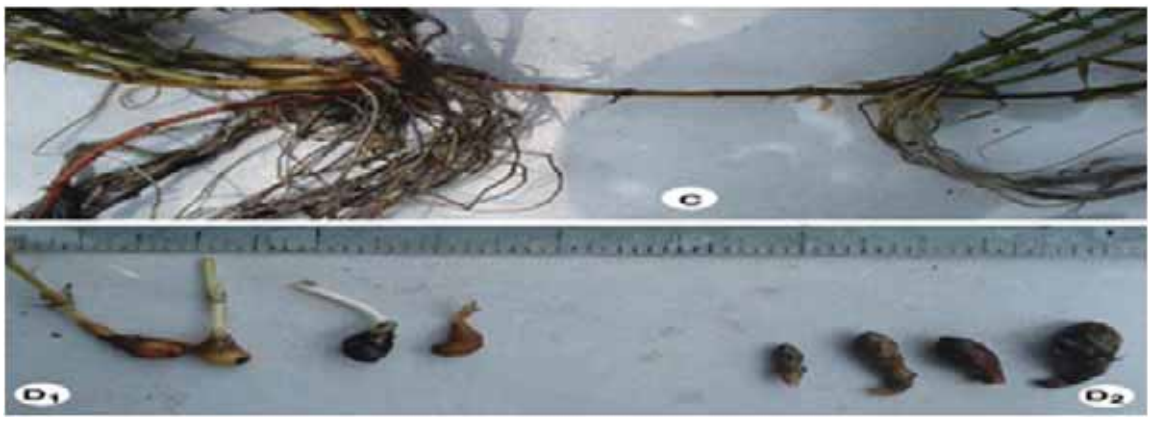
These aquatic weeds are particularly difficult to manage because they are able to propagate via a number of different mechanisms including seeds, but more commonly, tubers, turions (apical or axillary growing tips), stolons and stem fragments (see examples on following page). Some of this vegetative material is able to survive in sediments and germinate when conditions are suitable.

There are many different ways that aquatic weeds can be spread in Tasmania. They have been introduced through the ornamental and aquarium trade, usually as a result of the dumping of unwanted fish tank water. Aquatic weed material can attach to fishing gear, boating equipment, trailers and even within clothing. This material can be transferred along irrigation drains and in pipelines, both within or between catchments. Once established, the weeds can out-compete native species, choking waterways, lakes and dams. Plant material can also block irrigation pipes, pumps and alter the waterway's nutrient and light regimes.

Parrots feather



(a) Leafy elodea (*Elodea densa*)
(b) Canadian pondweed (*Elodea Canadensis*)
(c) Oxygen weed (*Lagarosiphon major*)
Drawings by Dennis Morris



Aquatic weeds - Examples of vegetative propagules: (C) Two double-nodes separated by 6 short internodes in *Egeria densa,* (D1) Germinating tuber of *H. verticillata,* (D2) Growing buds of *E. densa.* (Source: Alfasane, 2010)

Environmental or troublesome weeds that are not declared

Non-declared 'environmental' weeds refer to weed species not listed under the *Weed Management Act 1999.* Many of these species can have impacts on the natural environment, agricultural values and the community and so it is appropriate to manage these weeds through effective hygiene practices and control measures.

Environmental weed examples include many species originally introduced as ornamentals such as blue periwinkle *(Vinca major),* foxglove *(Digitalis purpurea)* and watsonia *(Watsonia meriana)* that have spread into natural areas from the illegal dumping of garden waste. Many of these species are the subject of volunteer community weed control programs.

Other non-declared weeds include species that impact on cropping, grazing and other agricultural enterprises, including being toxic to stock. These include capeweed *(Arctotheca calendula),* hemlock (*Conium maculatum*) and spear thistle *(Cirsium vulgare).*

Montbretia
Photo: English Country Garden

Foxglove

Capeweed

Periwinkle

Watsonia

Pathogens and plant-like pests

Pathogens and the diseases that result can be very difficult to eradicate, and once detected, containment may be the only practical management solution. Prevention is the most effective management strategy, and that can be best achieved by having strong biosecurity and hygiene measures in place.

Phytophthora

Phytophthora ('fy-toff-thora') root rot is also known as cinnamon fungus; jarrah dieback; wildflower dieback and by its scientific name *Phytophthora cinnamomi*. It is a water mould (like a fungus) that attacks the roots of susceptible plants, in many cases killing the plants. In some native plant communities, epidemic disease can develop causing the death of large numbers of plants.

It is believed to have been introduced to Tasmania following European settlement and is now well established in many areas of moorland, heathland and dry eucalypt forest in the state. *Phytophthora* has the potential to alter the ecology of these vegetation types. Many different species of plants are affected by *Phytophthora* root rot, such as grass trees, white waratah and Christmas bells.

Some threatened plant species in Tasmania are known to be declining as a result of *Phytophthora* and more threatened species could also be affected should the pathogen spread.

Phytophthora may spread with the movement of infected soil or plant material by people or animals and may be transported by water moving through the soil or in creeks. People can transport the pathogen to new areas on dirt adhering to vehicles, items they are carrying or footwear. Unfortunately this pathogen is hidden from view within plant roots and its symptoms can be difficult to recognise in the field.

Information Source: DPIPWE Website
http://dpipwe.tas.gov.au/biosecurity/plant-biosecurity/pests-and-diseases/phytophthora

Additional information can be found in the *Keeping It Clean* manual.

Native grass trees affected by *Phytophthora* (Photo: Tim Rudman)

Chytrid frog disease

Chytrid (pronounced kit-rid) fungus (*Batrachochytrium dendrobatidis*) causes the disease known as chytridiomycosis or chytrid infection which currently threatens Tasmania's native amphibians. The fungus infects the skin of frogs destroying its structure and function, and can ultimately cause death. Sporadic deaths occur in some frog populations, and 100 per cent mortality occurs in other populations.

Chytrid infection has been devastating to frog species causing extinctions worldwide. The international trade of frogs probably brought the fungus to Australia from Africa. The disease has now been recorded in four regions in Australia - the east coast, southwest Western Australia, Adelaide, and more recently Tasmania. In mainland Australia chytrid has caused the extinction of one frog species, and has been associated with the extinction of three others. In addition, the threatened species status of other frogs has worsened through severe declines in numbers.

The movement of infected frogs, tadpoles and water are known to be key agents of spread. The fungus (or infected frogs or tadpoles) can be spread by people in water and mud on boots, camping equipment and vehicle tyres, as well as in water used for drinking, or spraying on gravel roads or fighting fires.

Information source: DPIPWE (website). http://dpipwe.tas.gov.au/biosecurity/animal-biosecurity/animal-health/wildlife/frog-disease-chytrid-fungus

For more information on chytrid frog disease and its distribution visit the DPIPWE website or read the Keeping It Clean manual.

Platypus mucor disease

Mucor amphibiorum is a native Australian fungus previously restricted to mainland Australia but has spread widely in northern Tasmania since 1982. It is likely that the fungus was introduced to Tasmania via infected frogs transported from the mainland. It causes a deadly ulcerative infection in Tasmanian platypuses.

It is currently not known how the mucor disease is spread and the risk of spread through movement of contaminated water or soil while undertaking activities and fieldwork in wetlands and waterways is unclear. However it is recommended that when handling platypus in the field specific hygiene protocols be applied. These protocols and further information about the mucor disease can be found on the DPIPWE website or in the *Keeping it Clean* manual.

Information Source: DPIPWE Website - http://dpipwe.tas.gov.au/wildlife-management/animals-of-tasmania/mammals/echidnas-and-platypus/platypus/platypus-fungal-disease

Platypus mucor disease
(Photo: Annie Phillips)

Plant-like Pests - Didymo

Didymo (*Didymosphenia geminata*) is a freshwater algae (diatom) that is native in the northern hemisphere, but has now established in New Zealand's South Island and Chile. Didymo starts life as a microscopic, single cell organism that forms stalked colonies and rapidly multiplies to form dense mats on the streambed. Once established it is extremely difficult to eradicate. It can be transported on gear that is used in contaminated streams and lakes – boat gear, fishing gear, waders, felt boots, packs and kayaks.

The dense mats that are formed alter the stream ecology, affecting the river's health, degrading the fishing quality of the river and fouling equipment such as motors, pumps and traps.

Information Source: DPIPWE Website http://dpipwe.tas.gov.au/biosecurity/aquatic-pests-and-diseases/aquatic-biosecurity-threats/didymo-(rock-snot)

For additional information on Didymo and its distribution visit the DPIPWE website or read the *Keeping It Clean* manual.

A didymo frustule (Photo: Sarah Spaulding)

Live cell of *Didymosphenia geminata* showing the mucilage stalk (Photo: Sarah Spaulding)

Didymo coating rocks and river bed in NZ.
(Photo: Sarah Graham)

4. Developing a Management Plan for Weeds and Diseases

What is a Weed and Disease Management Plan?

A weed and disease management plan covers the management and control of weeds and diseases for a particular area or site. It identifies relevant issues and specifies actions to be taken in order to remove or reduce the threat. Management plans may need to be produced for developments (eg. subdivisions, irrigation, roads, mines etc.), reserves, farms, quarries and residential properties.

Do you need a Management Plan?

It is in your interest to consider whether you need a management plan. If there are potential weed or disease issues, dealing with them in a timely and effective manner will save money and resources into the future. Depending on the issues at your site and the proposed activities, you may only need a weed or a disease management plan.

Generally, if the weed or disease issue is not complex then the plan may be relatively simple. The more complex the issues, the more detail usually required.

In deciding if you need a management plan, consider whether there is an existing weed or disease problem (this may require a detailed survey), and whether the development or activity itself could create a problem. Remember that soil disturbance can lead to germination of weeds, while importing materials (for example, soil, gravel, water, plant material) can bring weeds and diseases onto a site.

If there are declared weeds at the site, or there is a potential that declared weeds could be spread to the site (eg. from a quarry) then the land manager and contractors will have a legal obligation to control those weeds and prevent any spread. Whilst there is no legislation covering the spread of environmental pathogens, permit conditions may require that the developer consider the hygiene and management issues.

A template for weed management plans can be found in appendix 1 and guidance on hygiene management in appendix 2.

A Weed and Disease Management Plan should cover as a minimum:

- Over-arching set of objectives
- Assessment of the distribution of declared and environmental weeds and diseases.
- Accurate map of weeds and diseases
- An assessment of the potential impact of the weeds and diseases
- Short and longterm priorities for management and control of weeds and diseases.
- Strategies for managing weeds and disease spread associated with the development.
- Strategies for ongoing monitoring and control of weeds associated with the development.
- Identification of appropriate herbicides and other methods for weed control.
- Methods to prevent disease spread (see also *Keeping it Clean – A Tasmanian field hygiene manual*).

Producing a Management Plan

Production of a management plan may be the responsibility of the landholder or land manager, the proponent of a development or the project officer coordinating activities. Whilst there is no set design for a management plan, all management plans will have similar elements:

Description of project, development or activity and site
Describe the proposed activity, development or land use, (eg. roadwork, dam, farm, mine, quarry) and detail the aims and objectives of the management plan.

Site description and location
Describe the site, including operational areas, stockpiling areas, cleandown areas and other ancillary and administrative areas. Most of these areas can be shown on maps, although some may need to be accompanied with detailed descriptions. There should also be maps that show the general location of the development, showing north, clear legends and the location relative to Tasmania as a whole.

Weed and disease issues
Identify and document existing and potential weed and disease issues at the site. The plan should provide a summary of declared weeds and significant non-declared weeds.

This should include an inventory of any previously recorded weeds and diseases via database searches and previous reports. In most situations a detailed onground survey of weeds and visual assessment for evidence of disease at the site will be required.

Timing of the survey needs to be considered, as some weeds are either not present (eg. annual weeds) or are not easily identifiable (eg. not flowering) all year. All survey work should be undertaken by a competent specialist in the field.

Recording and mapping of existing weed and disease distribution
Weed and/or disease locations should be shown on maps as well as being documented in a spreadsheet with coordinates (this table would be found in the appendices of the plan). Maps should be clear, contain obvious features such as roads, towns, hills and rivers to help identify locations.

Map of existing assets to be protected
Weeds and disease maps should be overlayed on to maps showing assets and areas requiring protection. This could include areas of ecological or conservation significance or important agricultural values. Advice should be sought as to appropriate permits that may be required in relation to values present and works proposed.

Things to remember:

- Identify known weed and disease issues through literature and database searches (this should include records for adjoining areas).
- Survey the relevant area and document observed weeds and diseases.
- Where required collect soil and or water samples to detect disease pathogens.
- Prioritise weeds – declared weeds; significant environmental weeds.
- Check identification of weed or disease symptom if uncertain.
- Be careful not to spread the weeds or disease when surveying.

Assess and document weed and disease risks and impacts

Once weed and disease surveys have been completed, an assessment of the potential impacts of those threats will help in establishing priorities for management and control. For example, if there is a Zone A declared weed growing in an area where construction work may cause it to be spread, then it would be a priority for control. A risk assessment tool is provided in Appendix 2.

Setting short and long term priorities

Using collected information for species or diseases present, distribution, density, impacts, legislative responsibilities, determine short and long term management priorities – what weed species (or diseases) should be controlled and what are of less concern.

Relevant legislation

There is a range of legislation, legislative instruments and codes of practice in Tasmania which may be relevant to your project. The plan should list all legislation, permit conditions, codes of practice and technical documents relevant to the plan and how they have been addressed. The summary of weeds present at the site should also include the listings of the weeds within the *Weed Management Act 1999*.

See **Section 2** for further information about legislation.

Example of Spanish heath Zone A and Zone B areas in northwest Tasmania

Legislated priorities – declared weed zoning

Management requirements for declared weeds vary between weed species and municipality. All declared weeds are categorized as either Zone A or Zone B and these are listed in the statutory management plans for each declared weed. In general, a Zone A weed would be a higher priority for control than a Zone B weed. The statutory weed management plans can be viewed on the DPIPWE website:

DPIPWE Website:
http://dpipwe.tas.gov.au/invasive-species/weeds/weeds-index/weeds-index-declared-weeds

Zone A municipality – Eradication is required. Land managers should be actively eradicating the weed on their properties.

Zone B municipality – Containment is required. Land managers must take efforts to prevent the weed from spreading from their properties.

Other relevant documents or strategies

Other strategies such as Weeds of National Significance (WONS) strategies and best practice manuals, regional or municipal weed plans may be useful to refer to. There may also be other technical documents relevant to the specific site and/or development that have been produced from previous surveys. Property management plans, rivercare plans and vegetation management plans can all be sources of useful information.

Hygiene management activities

The weed and disease management plan should identify any potential hygiene management issues. For example, if there is likely to be vehicle and machinery moving on and off site or if materials such as soil, sand or gravel imported onto or exported from the site then there is a risk of spreading weeds or diseases. If this is likely to be the case then a hygiene management plan should be developed.

The development of a hygiene management plan is covered in **Section 5** of this guideline.

Strategies for managing the weeds and diseases

Control information can be detailed in tabular form and should describe methods for control (eg. herbicides, physical removal, burning, cultivation, etc), timing of control activities and frequency, methods for checking/monitoring infestations to determine effectiveness, and any follow-up measures.

If weed material cannot be safely disposed of on-site (eg. deep burial) then alternative means of disposal should be identified. This may involve arranging for incineration, deep burial or composting at a refuse centre. Where this material requires transportation from one site to another a permit may be required.

Operational management zones

For sites with more complex weed infestations, such as multiple weed species spread across a number of areas, management zones will need to be developed and documented on maps. Weed management zones may reflect the presence or absence of particular weeds, different management and control priorities, short term and long term priorities, and stockpiles.

The plan should also delineate all quarantine areas, traffic control zones and cleandown areas. The means by which zones are to be sign-posted and maintained on the ground (eg. signs, barriers, fencing) should also be detailed. Once weeds and diseases have been identified for a site or area management and control strategies can be developed. This should include appropriate removal methods and information on the type of herbicides and how they are to be used (see following map).

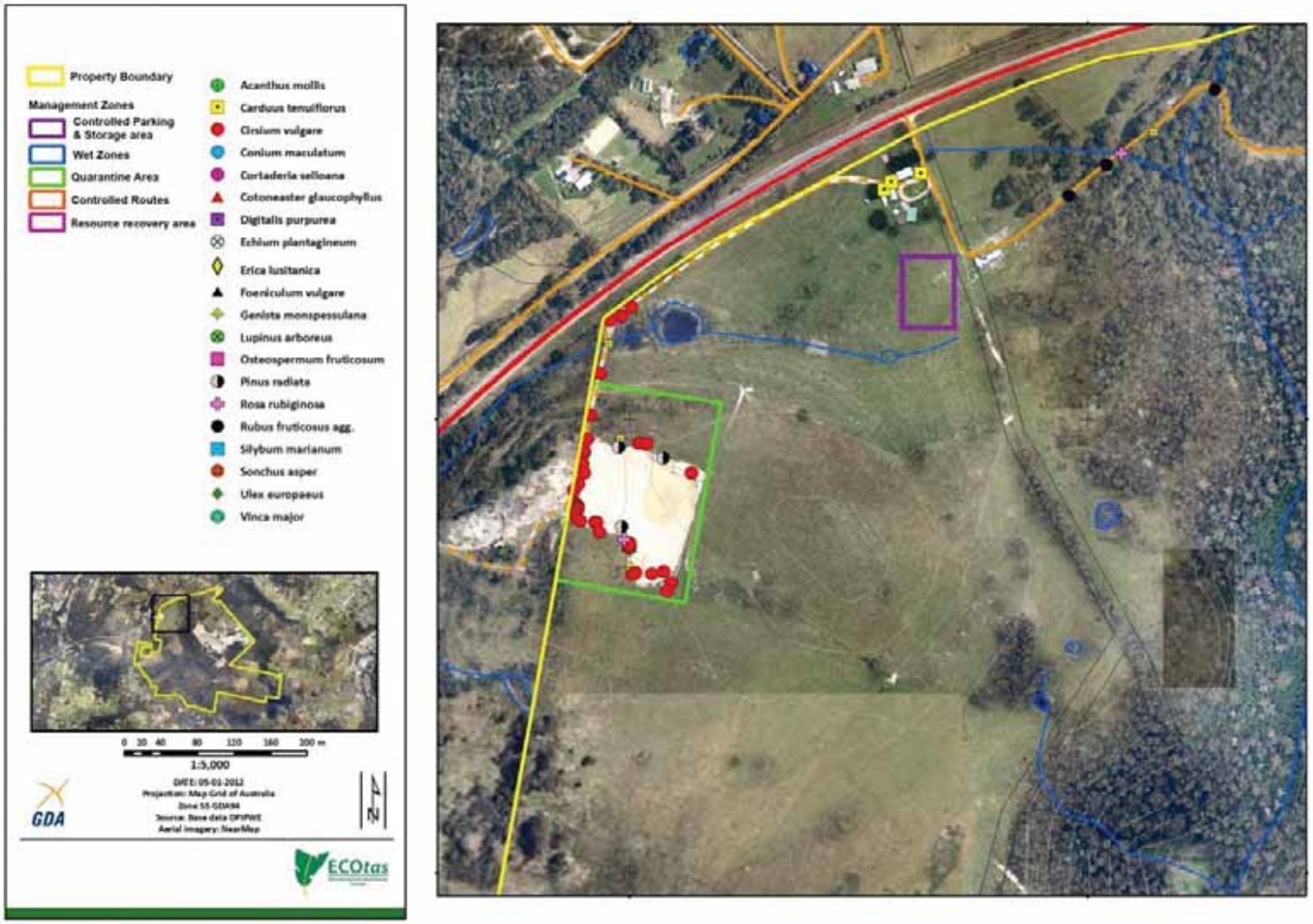
Monitoring and review

Addressing weed and disease management issues at a site does not stop with the completion of a development and associated works. A management plan needs to consider ongoing monitoring at a site. Post-development monitoring is particularly important where there has been soil disturbance, importation of materials (soil, gravel, sand, etc.), changes to drainage patterns, or removal of vegetation. Any of these actions can lead to the germination of dormant seed, or to the establishment of wind-blown weeds/seeds on recently exposed soil.

The timeframe for monitoring will vary depending on factors such as the presence of soil seed banks, the possibility for complete eradication of infestations and the likelihood of re-infestation from adjoining areas. Monitoring at a site may have no specified end date and be ongoing.

A monitoring program should identify:

- Personnel involved;
- Frequency and time-of-year of inspections;
- Reporting protocols;
- Response to weed or disease incursions.



Weed map showing management zones (Source: EcoTas)

5. Developing a Hygiene Plan

We all have a responsibility not to spread weeds and diseases. Weed seeds and pathogens can travel sight unseen in materials such as soil, sand, gravel and water, in mud on footwear, or lodged in nooks and crannies on machinery, vehicles and other equipment.

> Prevention is the most cost-effective form of management.

It is easy to overlook the risk of accidently spreading weeds and diseases; however this can lead to long-term and expensive consequences. Failure to carry out adequate hygiene measures can result in crop losses, stock damage or permanent environmental degradation, often incurring substantial cost to the land owner or manager.

What is a hygiene plan?

A hygiene plan addresses the potential introduction and spread of weeds and/or diseases as a consequence of a development or activity. It identifies specific actions in order to avoid, mitigate and reduce the potential spread of weeds and diseases. A hygiene plan targets:

- Vehicles, machinery and equipment
- Materials such as soil or gravel
- Recreational equipment and clothing
- Feed and fodder

Examples where a hygiene plan might be needed include developments or work sites, conservation reserves, farms, and quarries. In fact, any site which can be clearly delineated in area and which has an existing or potential weed or disease problem, and where activities may lead to the spread of those weeds, should have a hygiene plan.

The hygiene plan can be a stand-alone document or it could be included as part of a weed management plan.

A template for developing a weed and disease management plan, which includes hygiene management, can be found in appendix 1. Operational considerations for hygiene management are in appendix 2.

A Weed and Disease Hygiene Plan should cover as a minimum:

- Cleandown protocols when travelling between clean and contaminated areas within the development footprint.
- Cleandown protocols for vehicles and machinery entering or leaving the site.
- Location and management of cleandown areas and facilities, including management of effluent.
- Logbooks detailing adherence to hygiene protocols.
- Material hygiene (soils, gravel, plant material etc.) – ensuring that no materials contaminated with weed propagules (seed, propagative vegetative material), pathogens or other pests are imported into or exported from the site.

Do you need a hygiene plan?
It is in your interest to consider the issue of hygiene management. Remember, you may be the one who has to deal with any weed and disease problems on a site into the future. Always be conservative with respect to hygiene measures and potential weed and disease problems, and always think long term.

If your development or activity has identified any existing or potential weed or disease issues then it is likely you will need to develop a hygiene plan. The type and scale of this plan will depend on the complexity of your project.

If there are declared weeds at the site, or there is a potential that declared weeds could be spread to the site (eg. from a quarry) then the land manager and contractors will have a legal obligation to prevent any spread.

The project may involve bringing machinery in from the mainland and may therefore be the subject of requirements under the *Plant Quarantine Act* (refer to the current Plant Biosecurity Manual).

Planning ahead

Development of a hygiene plan allows you to consider:

- Type of hygiene issues that need to be managed.
- Possible alternatives to avoid hygiene problems.
- Coordination and timing of works and hygiene management actions.
- Site access issues and vehicular and machinery movements.
- Development of works schedule - working from clean to dirty areas.
- Identify no-go areas to avoid disturbance and weed infestations.
- Selection of appropriate equipment and machinery.
- Identification of stockpile sites.
- Identification of cleandown sites and methods.
- On site resources, ie access to water and other facilities.
- Communications and training for staff, contractors and other visitors.

Producing a hygiene plan

Production of a hygiene plan may be the responsibility of the landholder or land manager, the proponent of a development or the project officer for a specific activity. Each hygiene plan will differ depending on the nature and size of the site or development, and on the weed and disease problems involved.

Elements of a hygiene plan

Identify weed and disease risks
This could be in a table format, and should identify issues, such as:

- vehicle and machinery movement,
- import and export of materials such as soils, sand or gravel and other products,
- disturbance to sites and vegetation,

where they occur and state how (where possible) they will be managed. Solutions might include sourcing soil and sand from accredited sources, sourcing pathogen free water (eg. from treated systems, rainwater tanks), designated parking and storage areas, minimising disturbance, fencing areas including vegetation etc..

Identify hygiene management zones
Maps should clearly identify the location of all hygiene related infrastructure including;

- clean down areas,
- effluent drains and sumps,
- quarantine zones,
- stockpile areas,
- solid waste storage areas,
- work areas, traffic routes, parking and storage areas.

Stockpile areas refer to areas where soil, gravel and sand is stored prior to use at the site or for removal from the site. Waste storage areas refer to the storage of weed material or other material that is contaminated with weeds or diseases and is to be appropriately disposed of or treated.

Operational Procedures

Operational hygiene protocols for each zone and the works site in general need to be documented. These include:

- Staff and contractor induction procedures.
- Cleandown protocols for vehicle, machinery and equipment movement between clean and contaminated areas within the site and also entering or leaving the site.
- Vehicle and machinery inspection procedures.
- Logbook to document sources and movement of material on or off site (soils, gravel etc.).
- Logbooks to document vehicle and machinery cleandown activities.
- Other issues specific to project.

Operational information relating to hygiene management can be found in appendix 2.

Avoiding the importation of contaminated materials

Raw materials such as soil, sand, gravel and water may be contaminated with weed seed or with plant and animal pathogens. Material from a quarry infested with gorse may well contain gorse seed which can remain dormant for many years, leading to the spread of the weed to other sites. Similarly, water sourced from ponds or dams containing the amphibian fungal disease chytrid can lead to the spread of this disease to un-contaminated water bodies.

Because many weed seeds and most plant and animal pathogens are either inconspicuous or invisible to the naked eye, it is extremely difficult to know whether a given load of material is contaminated or clean. Thorough testing of the source material to exclude contamination, or sterilising is often not feasible.

Temporary cleandown area

Nevertheless, the chance of importing contaminated material to a site can be significantly reduced by keeping in mind the following:

What you can do to reduce contamination risks -

- Ensure that there are no declared weeds and significant environmental weeds on the site from where you are obtaining material. There is a high risk of contamination of material such as sand, gravel, soil and water when sourced from a site which is clearly infested with a particular weed or disease.
- Keep in mind that the presence of some weeds and most pathogens will not always be obvious. For example, a weed may be present at a site as dormant seed in the soil or as tiny propagules in water, or present but not conspicuous (for example, not in flower).
- Investigate the hygiene measures in place at a prospective quarry or other source-point for raw materials. Shop around for the safest option.
- Wherever possible, source material from companies or sites which have been subject to some form of assessment for weed and disease hygiene. Don't be shy to ask questions of the supplier. Some industry groups have sought accreditation to demonstrate that their operations maintain sound hygiene practices. Where possible request a vendor declaration demonstrating their product is free of weeds or pathogens.
- Where there is a known risk or plants or animals sensitive to disease present, water should either be treated or sourced from rainwater tanks.
- If you encounter a problem with imported materials carrying weeds or diseases, inform the source company of the problem immediately and notify any relevant authorities.

6. Communicating the plan

Communicating your hygiene plan
The key to implementing a weed management and hygiene plan is to be able to effectively communicate it to everyone who will be involved in the operational components of a development. These include site managers and supervisors, on-site staff and contractors using vehicles operating machinery and equipment. The information needs to be easily understood and readily accessible, and may need to be produced in different forms depending on the target audience.

Training
Training is a key requirement for ensuring staff are aware of their different levels of responsibility and aware of the relevant aspects of weed and disease hygiene management. This training can be provided through external organisations or even facilitated through the relevant Government or Natural Resource Management organisations. Training needs to be tailored towards the needs of the organisation, their legislative responsibilities and the roles and responsibilities of staff.

Induction
Contractors and other visitors to a site need to be aware of the hygiene protocols operating at that site. As part of the general site induction process, new visitors to a site need to be made aware of the site hygiene protocols, exclusion areas and cleandown procedures.

Toolbox training
Many organisations have weekly toolbox meetings where they discuss issues such as work place health and safety and other matters relating to operational activities. These meetings also provide an opportunity to inform staff and reinforce requirements relating to weed and disease hygiene management protocols and how they should be implemented.

What documents need to be provided to operational staff?
A hygiene management plan forms the overarching document and contains all of the relevant information required to manage weed and disease hygiene at a site. However the plan may be a large, complex document that doesn't lend itself to be easily implemented by individual staff. Consequently, a subset of documents based on the plan will need to be provided to staff, including:

- Summary of hygiene protocols.
- Check lists.
- Maps detailing cleandown locations, quarantine areas and treatment areas.
- List of available cleandown resources and their locations.
- Information on cleandown procedures for specific machinery and vehicles (kept with the relevant machinery and vehicles).

Log books should be kept with vehicles, and depending on the nature of business and the vehicle/machinery use detail:

- Driver details and dates of travel
- Incoming and outgoing soil, gravel and sand delivery details (source and delivery locations; type of material; known contaminants).
- Record of cleandown activities for the vehicle/machinery

7. Case Studies

Case Study 1

Weed hygiene - Underground Powerline

An infrastructure project undertaken by power company Jemena (now Zinfra) through Launceston's eastern suburbs in winter 2011 provides a good example of practical weed management through project planning and vehicle, machinery and equipment hygiene. A power cable was to be laid underground across a floodplain in winter. During the planning phase, consultants identified weeds, potential plant pathogens and threatened flora and fauna as issues. Additional information for the area was collected from DPIPWE's Natural Values Atlas and DPIPWE's Regional Invasive Species Management Section regarding other potential weed management issues.

DPIPWE also provided information on best practice weed management procedures. Out of this came a practical approach from Jemena and the contractors for vehicle and machinery movement that limited the spread of weeds within the project and adjoining areas.

Using the weed presence and density maps the planners and project manager identified management zones within which any weed infested area, such as a gorse patch, could be isolated from neighbouring weed free areas. Each zone had a single entry/exit point and vehicles going in and out through this point had to be inspected.

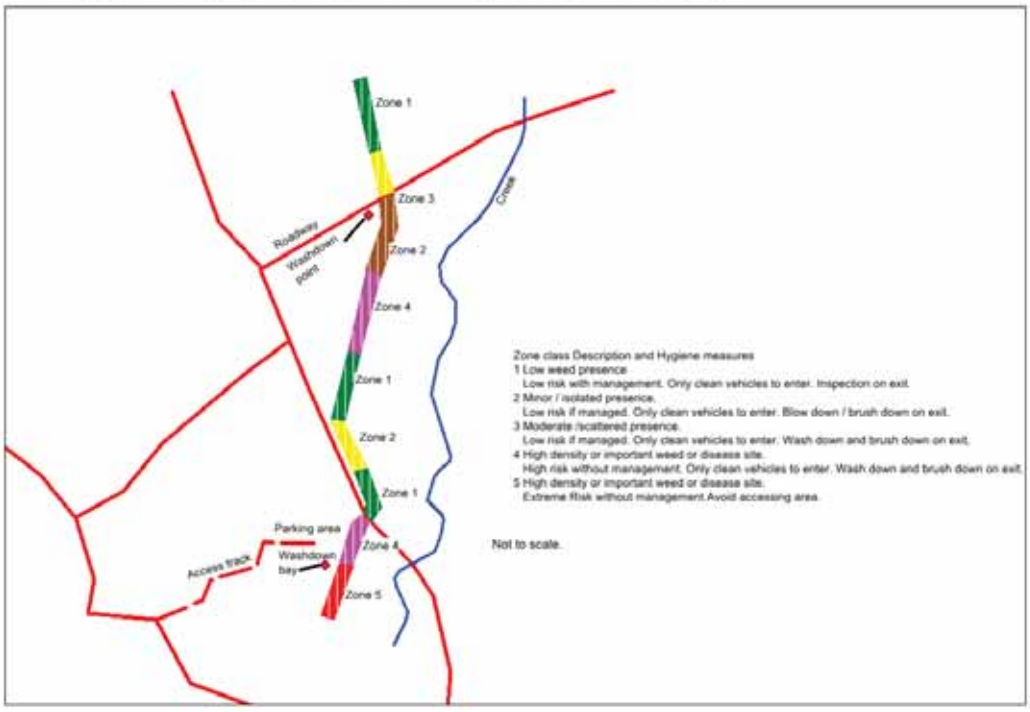
Where a vehicle or machine had remained on the constructed road surface in good weather it required no more than a quick inspection. However, any piece of equipment or machinery that had direct contact with weeds or soil was treated as potentially carrying propagules that might be transferred from one site to another. These items were subjected to cleandown. The degree of cleandown was determined by the level of contamination. Site conditions were also important in determining the degree of cleandown. Where the site was dry and firm and there was little or no standing weed presence a machine may have needed no more than a brush / blow down or light hosing.

Cleaning down digging machinery

For the most part, Jemena's project was implemented through winter, much of it on an already wet floodplain alongside the North Esk River. To cope with this Jemena and the contractor installed temporary cleandown bays at the entry/exit points of each of the management zones (see site map). The cleandown bays consisted of a pad of heavy, course roadbase material built up about 300mm and big enough to fit a cleandown rig and any large machine used in the project. This pad drained into a sump lined with geofabric constructed at its downslope edge to catch run-off and sediment. When full, the sump was pumped out and material disposed of at Launceston City Council's refuse landfill. At completion of works, the roadbase pads were removed and disposed of as landfill. Cleandown bay locations can be monitored over time and any weeds controlled.

Top photo: Temporary cleandown bay
Bottom photo: Geofabric lined cleandown sump

Example site map: work zones based on weed and disease risk



Case Study 2

Weed management and hygiene plans for a residential development.

In 2010 Waverley Tasmania Pty Ltd purchased a derelict timber mill site at St Leonards on the south-eastern fringe of Launceston with a view to developing the site as urban residential land. The site of approximately 40 hectares includes a gully which adjoins park land managed by Launceston City Council. The north side of the property bounds residential development, while its southern neighbours include several peri-urban grazing/lifestyle blocks.

Weed management and hygiene planning was a requirement of the local government's planning permit for the demolition phase of the property development. This case study is based on the weed management plan developed for the site (Povey, 2010).

Development of the Weed Management Plan

The initial phase of the project involved a desk top study and field investigation to identify the natural values and potential threats to these values, such as weeds. Background information came from a search of the DPIPWE Natural Values Atlas (NVA); from review of the Statutory Weed Management Plans (SWMP) for each of the declared weeds present and from discussion with the relevant specialists. The second phase of work involved detailed site inspections to identify and record site features including weed presence and density.

DPIPWE's NVA Home Page
(new users can register at site)

The mill weed management plan summarises information from relevant SWMPs into a table identifying:

- the name of the weed;
- it's status within the site (whether declared or not);
- its zoning under the *Weed Management Act 1999*; and consequently
- the objective for each weed within the municipality.

> A Natural Values Atlas (NVA) report provides information on the presence of native flora and fauna, weeds, phytophthora and chytrid at a site and areas adjacent to the site. This information should be accessed as part of the impact assessment and construction planning components of a development. The NVA database can be accessed via DPIPWE's web site.

Setting objectives for weeds at the site

Six significant weed species were identified by the plan. Five of these are declared weeds (which property managers are required by law to control) and one, hawthorn, is a non-declared significant environmental weed. The declared weeds present are:

- Paterson's curse
- Gorse
- Blackberry
- English broom
- Canary broom

The woody weeds occurred predominantly within a degraded woodland area surrounding the old sawmill. Paterson's curse infested road edges, and any cleared land amongst the bush and across open spaces between the mill and bushland and was identified as a significant weed on the site. The SWMP for Paterson's curse identifies Launceston Municipality as a "Zone A" area ie. an eradication zone. The St Leonards area is one of relatively few areas of intense infestation of this aggressive weed in the state. Eradication from this site will contribute to its eventual eradication from St Leonards.

One of the first steps in the control of Paterson's curse is to prevent spread through preventing seed set of plants germinating on site and to ensure that Paterson's curse material does not leave this site (e.g. as seed in soil). This last point, in particular, is a critical reason for the development of the accompanying weed hygiene plan.

Each of the remaining declared weeds are classified as Zone B in the municipality and therefore containment is the primary objective. It should be noted that where a weed can be eradicated from a site, regardless of its zoning, this should be attempted. Broom is an example of this, where its eradication is feasible due to low presence and density on the property. The plan also provides objectives for the significant, non-declared environmental weeds. Again all are summarised in a table identifying:

- The weed;
- its extent on the property; and
- objectives for control on the site.

Weed Survey

The location of weeds found during flora and fauna surveys were recorded using a handheld GPS.

A map was then produced identifying site features, native vegetation and weed infestations. Each infestation was assigned a density. Density classes were those used for monitoring Weeds of National Significance (WONS), as tabled in *A Field Manual for Surveying and Mapping Nationally Significant Weeds* (McNaught *et al*, 2006):

Density Class Number	Percent Cover Range or Description
1	Absent
2	Less than 1%
3	1 – 10%
4	11 – 50%
5	Greater than 50%
6	Present (density unknown)
7	Not known (or uncertain)
8	Not assessed

Weed Control Strategies and Methods

The plan provides a brief weed control strategy for each of the major weeds. The control strategies are linked to the SWMP objectives to eradicate or contain the weed; the density of the weed on the site; and its location and proximity to neighbouring properties.

For Paterson's curse this means control across the entire property, at least annually. For a "Zone B" weed, like gorse, control areas are prioritised according to the objectives of the SWMP (e.g. proximity to boundaries). A key priority is to protect and improve over time, the condition of any area of native bush being retained at the site.

Many of the weed species on the site are known to have long seed viability making regular monitoring and follow-up control a key to success in these works. The plan also recommends and describes a range of different methods to control each species. Additional information is provided from DPIPWE's website including permits and suitable, registered herbicides.

Timeline and Budget

The plan provides a timeline, in table form, for actions and likely costs for particular areas e.g. a separate timeline for Paterson's curse; the urban development area; and the areas of native vegetation. The table identifies weed control actions that need to

start prior to demolition at the site. Importantly, each timeline includes reference to relevant sections within the plan and to actions from the hygiene plan that will need to be implemented concurrently.

Tasmanian *Weed Management Act 1999*

The mill plan makes reference to the *Weed Management Act 1999* including landholder responsibility to *'take all reasonable measures to control the impact and spread of a weed…'* and makes particular mention of the offences identified under Section 56 of the *Act* (including that it is an offence to… *'grow, propagate, scatter or transport a declared weed (including "deal with … any material or thing … carrying the weed in any manner that is likely to result in the spread of the declared weed'*, such as soil). This highlights the proponents responsibilities to prevent the spread of declared weeds.

Development of the Weed Hygiene Plan

A weed hygiene plan was developed to reduce the risk of weeds being introduced onto or exported off the site. The hygiene plan is a key document that ensures that the *Weed Management Act 1999* is not contravened.

It is a succinct, practical document that requires all consultants and contractors to follow. The document is designed to be included in site inductions for all people entering the site.

It is essential that hygiene plans are easy to understand and easily communicated to a range of people, which this plan achieves. There is a very heavy presence of Paterson's curse across the whole site including the demolition area. The area includes a lot of bare soil and degraded pasture containing a large soil seed bank. The potential for machinery, vehicles, footwear, clothing and equipment to carry viable weed seed off site, particularly in soil and mud, is very high.

To avoid this happening, prescriptions are provided for frequency of cleandown, management of effluent, keeping of records, stockpiling and handling soil and demolition refuse, on-site and off-site disposal (requiring a permit to transport weed material from DPIPWE). A general, stepwise, cleaning inspection and cleandown procedure is provided together with checklists for systematic inspection and cleaning of the various kinds of machinery and equipment likely to be used on site.

A weed map of the site is included and helps personnel identify areas to be avoided, locations for stockpiling refuse and spoil prior to on-site burial and/or off-site disposal and includes the location of the on-site cleandown facility. In this case the cleandown facility will be located adjacent to previous infrastructure to utilise existing water points. A large area of concrete pad exists which can be drained to a central collection point. Material can then be disposed of by collection and burial.

Site map – The Old Mill – St Leonards, Launceston (courtesy Bushways Environmental Consultancy)

Paterson's curse rosettes at the St Leonards site (Photo: Anna Povey)

8. Appendices

Appendix One: Weed Management Plan Template

Appendix Two: Hygiene as Part of Weed and Disease Management Planning

Paterson's curse (*Echium plantagineum*) - drawing Dennis Morris

APPENDIX ONE: WEED MANAGEMENT PLAN TEMPLATE

COMPANY NAME

Name of Project

Weed and Disease Management Plan (including options for hygiene management)

AUTHOR

Date

Type the abstract of the document here. The abstract is typically a short summary of the contents of the document

1 Document History and Distribution

Version Control

Version	Date	Author	Notes

Distribution

Version	Recipient	Date	Notes

USE OF TEMPLATE (DELETE IN YOUR DOCUMENT)

This template outlines the structure of a Weed and Disease Management Plan with options for including hygiene management. In particular circumstances, the plan may only focus on weeds or diseases, not necessarily both. The format of the template consists of a text box that details the information that should be included for that section and an example of the sort of information that could be provided in italics after the text box, for example:

- *suggested wording where possible to ensure inclusion of important elements and reduce time spent on preparing the report*;

> Text in boxes are guidance to the type of project related information that needs to be included in that section.

This template is intended as an example of a weed management plan - ultimately, the content and structure of a weed management plan will be driven by the nature of the development and the legal requirements of the development permits.

CONTENTS

1. INTRODUCTION

This section should include a summary of the project, description of the location, nature and size of the project and provide sufficient detail of the various stages of the project so that it can be clearly understood. A map of the site(s) with legend and geographic locators should also form part of this section.

1.1 Purpose and Scope

The purpose of this Weed and Disease Management Plan (WDMP) is to detail requirements for the management of weeds associated with the construction of ***Name of Project****. The WDMP identifies site specific mitigation measures and environmental controls for weed management to ensure weeds and diseases are effectively managed during works and into the future. The WDMP identifies measures to control. eradicate and prevent the spread of declared weeds and environmental weeds.*

1.2 Background, Aims and Objectives

Describe the proposed activity (development or land use, roadwork, dam, farm, mine, quarry etc).

This WDMP aims to provide a detailed methodology for mitigating and managing impacts associated with the presence, emergence and spread of weeds, throughout the project.

The objectives of the Weed and Disease Management Plan are to:

- *Record the distribution of weeds declared under the Weed Management Act 1999.*
- *Record the distribution of significant, non-declared, environmental and agricultural weed species.*
- *Record the presence and distribution of pathogens.*
- *Provide control measures for identified weeds and pathogens and prevent new weeds and pathogens from establishing and spreading.*
- *Establish an ongoing monitoring and control program for weeds and pathogens into the future for the site.*

1.3 Site Description and Location

Describe the site, including operational areas, stockpiling areas, cleandown areas and other ancillary and administrative areas. These areas should be shown on maps, although some may need to be accompanied with detailed descriptions. The maps should also show the general location of the development, showing north, clear legends and the location relative to Tasmania as a whole (See template appendix a).

1.4 Supporting Documents and Consultation

You should refer to sources and documents including desktop studies eg. NVA reports, botanical surveys, field investigations and consultation undertaken in relation to the project.

1.5 Glossary

EXAMPLE ONLY *Table 1. Glossary*

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

2 LEGISLATION, STRATEGIES AND PLANS

There are a range of legislative and regulatory instruments and codes of practice in Tasmania which may be relevant to your project. The plan should list all relevant legislation, codes of practice and technical documents and how they apply to the plan.

Other strategies such as Australian Government Weeds of National Significance (WONS) strategies and best practice manuals as well as regional or municipal weed plans may also be relevant. Previous weed management or vegetation management reports for the site or adjacent areas as well as property management plans and rivercare plans may contain relevant information.

DPIPWE's Natural Values Atlas contains distributional data for weeds, *Phytopthora*, chytrid and native flora and fauna. There is a public access point, but users need to register. It's important to note that the absence of records for a site does not mean that there are no weeds there, rather that no one has surveyed the area or put the data into the NVA.

EXAMPLE ONLY - *Table 2. Legislation, strategies and plans*

Legislation, Strategy, Code of Practice	***Application***
Eg. Weed Management Act 1999	*The Weed Management Act 1999 is the primary legislation relating to declared weeds in Tasmania*
Eg. Cradle Coast Regional Weed Management Strategy	*Principal framework for weed management in the Cradle Coast region with the aim of identifying priorities and weed management actions within the region*
Eg. Keeping it Clean – A Tasmanian field hygiene manual to prevent the spread of freshwater pests and pathogens	*Provide guidance on hygiene management and to reduce the risk of spreading environmental diseases*

3 EXISTING AND POTENTIAL WEED AND DISEASE ISSUES

Weeds, diseases and other pests have the potential to establish and/or spread across the project site during construction. Increased weed colonisation could potentially have some impact on the ecological values of adjacent remnant vegetation through displacement of native species and degradation of fauna habitat.

Weeds may be introduced and spread by construction vehicles or by contaminated soil or materials bought into the construction area (eg. Vehicles, machinery, equipment, clothing and boots)

3.1 Recorded Weed Species

A weed assessment was undertaken on behalf of the project proponent in (DATE). The following areas were surveyed and distribution of weeds shown on Map XX. Each of the recorded species was classified according to their status under the Weed Management Act 1999, and (where appropriate) as per the following strategies (eg. Weeds of National Significance, Regional Weed Management Strategy, priority environmental weeds etc.).

Declared weeds:

This information should go in the appendices of the plan with a brief summary here. Any significant weed species or weeds requiring special management attention should be discussed here.

Declared weeds in Tasmania are plants that have been declared under the Weed Management Act 1999. The legislation requires that these species be controlled or eradicated according to the relevant statutory management plan.

XX number of declared weeds were recorded during the survey and/or identified from other sources. Detailed management strategies for environmental weeds are provided in template appendix b.

Environmental weeds:

This information should go in the appendices of the plan with a brief summary here. Any significant weed species or weeds requiring special management attention should be discussed here.

Although many common weeds are not listed under legislation, and are therefore not legally required to be controlled they have the potential to pose a threat to the ecological and agricultural assets present in the project area and interfere with different stages of the development. Common 'non-declared' weeds include species such as cape weed (Arctotheca calendula) and scotch thistle (Cirsium vulgare).

XX number of environmental weeds were recorded during the survey and/or identified from other sources. Detailed management strategies for environmental weeds are provided in template appendix b.

Weed distribution should be shown on maps as well as being documented in a list, usually in the appendices. Data, including coordinates, that has been collected should be made available to the Natural Values Atlas. Maps should be clear, contain obvious features such as roads, towns, hills and rivers to help identify locations.

3.2 Recorded Diseases or Symptoms

Appropriate site controls (provide detail) will be implemented to ensure that causing pathogens such as Phytophthora cinnamomi (Phytophthora) and amphibian chytrid fungus (Chytrid) are not introduced to the project area, and if detected, within the project area, that quarantine measures will be instigated to ensure that it is contained.

The main activities at risk of introducing or spreading Phytophthora and Chytrid include:

- *Through soil, sand gravel or other materials attached to vehicles and machinery used as part of the development works.*
- *Importing water or soil, sand, and gravel material for construction purposes (eg. roading. landscaping, filling, bedding etc.).*
- *Spreading the pathogen/disease from infected sites (contaminated) to uninfected (clean) sites.*

4 IDENTIFY MANAGEMENT PRIORITIES

Once the weed and disease surveys have been completed, an assessment of the potential impacts of those threats will help to identify priorities for management and control. For example, if there is a declared weed growing in an area that will allow it to be easily spread as part of the construction work, then it would be a high priority for control and a focus on hygiene management.

Priorities for weed control, that is, which species are high, medium or low priorities, should be detailed in the schedules for weed management, (template appendix c). Those priorities should also be clearly shown on the weed management maps (as zones).

5 MANAGEMENT AND CONTROL OF WEEDS AND DISEASES

Once weeds and diseases have been identified for a site or area, management and control strategies can be developed. This includes appropriate removal methods (including herbicide use information). Different weeds require different approaches to control, including the type of herbicides to be used. These should be documented.

Control information can be detailed in tabular form (template appendix c) and should describe methods for:

- Weed control in detail (e.g. herbicides, physical removal, burning, cultivation, etc.);
- timing and frequency of control activities;
- strategy for monitoring infestations to determine effectiveness, and any necessary follow-up measures into the future.

If weed material cannot be safely disposed of on-site (e.g. deep burial) then alternative means of disposal should be identified. This may involve arranging for incineration, deep burial or composting at a refuse centre. If declared weeds require transportation from one site to another a permit may be required.

Hygiene measures to prevent spread of weeds and diseases should be incorporated into the plan - detailed information on hygiene management is contained in Appendix 2.

6 COMMUNICATION AND REPORTING

The key to successful implementation of a weed management plan is ensuring that staff, contractors and visitors are all aware of their responsibilities in relation to weed management and hygiene. The weed management plan needs to be easily understood and be accessible to those who have responsibilities in relation to weed management. Tool box meetings and other workplace information sessions (eg induction) provide an opportunity to inform people on the site of their responsibilities. Signs, posters and maps also help to inform people.

Regular reporting and logging of weed control activities; vehicle, machinery and soil/sand/gravel movement into and out of the site; cleandown activities; and incidents ensures accountability and an ability to trace the source of a problem, allowing for quick mitigation to occur.

7 MONITORING

Rarely does the need for weed management finish when the development is completed. The presence of weed propagules, disturbance created and the movement of vehicles and materials all have the potential to encourage the persistence of weeds. A monitoring and control program should be developed and indicate:

- Personnel involved;
- frequency and time-of-year of inspections;
- reporting protocols;
- response to weed or disease discoveries (e.g. responsibility and procedure for control).

Ongoing weed control maybe the responsibility of the developer or the management of the development. The key point is that the responsibility to control declared weeds does not finish when the development has been completed.

Post-development monitoring is essential and particularly important where there has been soil disturbance, importation of materials (water, soil, gravel, sand, etc.), changes to drainage patterns, or removal of vegetation. Any of these actions can lead to the germination of dormant seed, or to the establishment of wind-blown weeds/seeds on recently exposed soil. Importation of materials can also result in the establishment of pathogens.

The timeframe for monitoring will vary depending on factors such as the presence of soil seed banks, the possibility for complete eradication of infestations and the likelihood of re-infestation from adjoining areas. Monitoring at a site may have no specified end date and be ongoing.

As an example:

The following weed and disease monitoring activities will be undertaken at areas directly impacted by construction within the project area. These activities will involve:

- *Monitoring and weed control measures undertaken by a licensed weed contractor at least four times (early spring, late spring, summer, autumn) in the first year following construction of the project.*
- *Monitoring and weed control measures undertaken by a licensed weed contractor twice per year (mid-late spring, mid-late autumn) in the subsequent four years following the project.*
- *Monitoring vegetation condition and collecting soil samples to detect signs of Phytopthora once every two years in autumn.*

Appendix a: Weed Management Plan – Site Plan

- Include site map and any other relevant maps eg: proposed routes for pipelines or roads, location of threatened species or vegetation communities.
- Ensure the map/site plan has a legend, north arrow and contextual reference for the location of the site.
- Show all relevant weed management and hygiene management points:
    - entry and exit points
    - cleandown areas
    - quarantine/exclusion zones
    - Control points/areas
    - traffic ways
    - designated parking areas
    - material storage areas for soil, sand and gravel

SITE PLAN

Appendix b: Recorded Declared and Environmental Weed Species

Example Only

Common Name	Scientific Name	Status*	Municipal Zone A or B	Map Zones
gorse	*Ulex europaeus*	Declared	B	Zones 1, 6 & 8
boneseed	*Chrysanthemoides monilifera*	Declared	A	Zones 3, 4 & 7
sweet pittosporum	*Pittosporum undulatum*	Environmental	n/a	Zones 2, 6, & 7

*Declared or non-declared (eg environmental, agricultural)

Appendix c: Options for Weed Management.

Example Only

Management Zone*	Weed	Control method	Chemical	Timing	Frequency of control
1	Gorse	Cut and paint with herbicide	Glyphosate	Spring to early summer	1 treatment with follow up and monitor and respond in subsequent years
1	Pampas grass	Foliage spray	Glyphosate	Spring, summer or autumn to actively growing plants	1 treatment with follow up
2	Spanish heath	Cut and paint with herbicide	Glyphosate	Prior to seed set	1 treatment with follow up
2	Ragwort	Boom spray, foliar application	Lontrel, marker dye, surfactant	Nov – Feb	1 treatment with follow up
3	Slender thistle	Boom spray - rosette	MCPA	April to September	2 treatments throughout this time period
3	Gorse	Spot spray, foliar application	Grazon Extra, marker dye and surfactant	Spring to early summer	2 treatments throughout this time period
Etc.					

*Based on priorities for weed management

APPENDIX 2: Hygiene as Part of Weed and Disease Management Planning

As part of the planning for your specific activity or development you will have identified existing and potential weed and disease issues. The next step will be to determine which activities pose a risk of spreading these weeds and diseases. Of these activities, what can and cannot be avoided?

The level of risk associated with a particular activity will influence how and when hygiene measures will need to be applied. The risk matrix table on the following page will help assess the level of risk for a particular activity and the degree to which hygiene measures should be applied. From this you can develop a list or table of actions to implement to either avoid the spread of a weed and disease or mitigate the risk.

EXAMPLE

A construction site that is heavily infested with gorse requires an excavator on site. Risk assessment identifies that there is a high risk of machinery contamination *via* soil and plant material. To avoid contamination the following actions are prescribed:

- excavator cleaned down on site at completion of the job;
- all other vehicles allocated a specific parking area away from infested area and work zone;
- control access of other vehicles on site.

As long as these prescriptions are followed, only the excavator will require to be cleaned down. This saves time and money by not needing to clean down other vehicles - these may only need a visual check.

High risk situations and activities where weed spread must be avoided:

- Working within a specified quarantine area.
- Visiting locations known to be free of weeds and diseases
- Visiting areas containing significant values
- Visiting a remote area where access is only by boat, helicopter or light plane
- Transporting machinery to an island
- Operating machinery along roadsides or along river banks
- Operating in an area affected by a weed or disease that has been assessed as a high priority and should be contained
- Transporting weeds or materials (ie soil or gravel) known (or assessed as likely) to be contaminated with weed propagules or diseases.
- Moving machinery out of a local area of operation
- Moving machinery between properties

All of the above activities would require some kind of kind of hygiene measure to be implemented before, during or after the activity has taken place. This may involve cleaning of vehicles and machinery, equipment, clothing and people. The frequency of clean down operations (thus decreasing costs and time) can be reduced by planning and coordinating timing and order of works or activities.

Risk Assessment Matrix

Recommended actions for grades of risk	
Grade	**Risk mitigation actions**
A	Mitigation actions, to reduce the likelihood and seriousness, to be identified and implemented as soon as the project commences as a priority.
B	Mitigation actions, to reduce the likelihood and seriousness, to be identified and appropriate actions implemented during project execution.
C	Mitigation actions, to reduce the likelihood and seriousness, to be identified and costed for possible action if funds permit.
D	To be noted - no action is needed unless grading increases over time.
N	To be noted - no action is needed unless grading increases over time.

Rating for Likelihood and Seriousness for each risk			
L	Rated as Low	E	Rated as Extreme (Used for Seriousness only)
M	Rated as Medium	NA	Not Assessed
H	Rated as High		

Grade: Combined effect of Likelihood/Seriousness					
	Seriousness				
Likelihood		low	medium	high	EXTREME
	low	N	D	C	A
	medium	D	C	B	A
	high	C	B	A	A

Change to Grade since last assessment			
NEW	New risk	↓	Grading decreased
—	No change to Grade	↑	Grading increased

Source: Tasmanian Government Project Management Guidelines

Selecting a cleandown site

Cleaning down aims to prevent the spread of weeds or plant and animal pathogens. It is most effective where access can be managed with entry points, roads or tracks under controlled use restrictions. In selecting a site, consider the following:

- Locating the clean down site at the edge, or nearby, to any areas where weeds or pathogens need to be contained. Choose sites where land slopes back into an infested area or away from areas susceptible to infestation or the pathogen.
- Ensuring run-off will not enter any watercourse or water body - a buffer of at least 30m is desirable.
- Avoiding sensitive vegetation or wildlife habitat eg. remnant native vegetation and threatened species.
- Selecting mud free sites (e.g. well grassed, gravel, bark or timber corded) which are gently sloped to drain effluent away from the clean down area.
- Allow adequate space to move tracked vehicles
- Potential hazards, eg. powerlines
- Consultation with landowner and/or site manager.

Note that low loaders are not a suitable platform for cleaning machinery.

Wherever there are large quantities of effluent or there is a risk of runoff, the clean down area should be bunded and a sump constructed to safely dispose of the effluent. Take particular care where the effluent is likely to be contaminated with oils.

Mark or record the clean down sites with the landowner or manager for subsequent monitoring and weed control.

Consider your safety

Before undertaking any clean down work you will need to inspect the site or area for anything that will endanger personnel safety. Vehicles and machinery should be immobilised prior to cleaning down - check ignition, brakes and wheel chocks. Lower implements to ground and secure hatches. Wear appropriate Personnel Protective Equipment (PPE).

Equipment for vehicle and machinery inspections

Where regular vehicle and machinery inspections are required, it is useful to keep a set of tools to assist you with the task. Weed seeds, plant material and soil can become lodged in areas that are hard to see and difficult to access. The following tools may help you:

- Mirrors
- Tools to remove covers or guards (eg sockets, spanners)
- Torch
- Probe or rod
- Wire
- Safety glasses
- Gloves
- Tray and bags for contaminated material
- Books or identification guides
- Checklist for critical inspection points
- Camera

Cleandown equipment

Personal and small tool wash equipment

Where work is being undertaken in sensitive areas, especially where plant or animal pathogens are a known risk, portable wash baths for washing footwear and small tools should be used. Wash baths can be made from a fish box (or other suitably sized plastic box) fitted with an open weave plastic doormat, a scrubbing brush, pair of safety gloves, glasses, detergent or fungicide, and a container of clean water. For backpacking, a 2 litre bottle, scrubbing brush, safety gloves and glasses can be used for small tools and boot washing.

See page 42 for further detail about detergents and fungicides

Where field clean down is a regular practice, equipment should be carried for that purpose. Large commercial wash units are available, though in many instances small self-assembled systems will be adequate. In industries that use bushfire slip-on units, these are ideal, allowing more flexible choice of clean down sites. Small fire pumps or portable high pressure wash units are suitable. A shovel, crow bar and stiff brush are also required. Farm workshops should also have suitable clean down equipment. Where a blowdown only is required, onboard compressors or portable blower vacuum may be used along with a small brush.

Vehicle wash bays

Purpose built wash bays should be used whenever possible. These clean down facilities include effective effluent management systems to protect the environment. Commercial clean down facilities are available at most major towns and a few livestock sale yards.

Portable vehicle wash equipment

Clean down standards and procedures

General check of clothing and boots for mud, seeds and other plant material

(For more detail, refer to the *Keeping it Clean* manual)

Small tools and portable wash baths

1. Site the washbath just outside the infected area or at the departure point for the vehicle or aircraft.
2. Remove all loose mud and dirt from the object to be cleaned.
3. Use the recommended safety equipment if washing with a fungicide (safety gloves and glasses).
4. Part fill the washbath with clean water, a depth of about 4cms is adequate for boot washing. Mix a solution of detergent or fungicide as required (see below).
5. Clean boots, gaiters and equipment with the scrubbing brush.
6. Effluent containing registered products such as fungicides must be disposed of in accordance with label recommendations. Otherwise wherever possible contain the effluent for appropriate *off-site* disposal. Small quantities of effluent not containing registered chemical products may be spread away from watercourses at the site of soiling.
7. A final rinse or wipe with fungicide or methylated spirits can be used for sterilisation of scientific equipment.

For vehicles and machinery:

Note: DO NOT apply water to harvesters or other equipment that may be damaged by water.

1. Locate site and surface or construct bunding (if required).
2. Safely park the vehicle free of any hazards eg electrical power lines.
3. Check 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.
4. Remove any guards, covers or plates as required.
5. Knock off large clods of mud, use a crow bar if required and sweep out the cabin.
6. 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.
7. Clean down with a high pressure hose and stiff brush/crowbar. Use only freshwater, preferably from a treated source or rainwater tank, if washing down in the field.
8. 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 clean down e.g. tracked machinery.
9. If using vehicle ramps, ensure ramps load rating matches the vehicle, are placed on a hard level surface, cannot slide forward when mounting and that the handbrake is on and grounded wheels are chocked when in use.
10. Clean any associated implements, e.g. buckets.

11. Check there is no loose soil or plant material that could be readily dislodged or removed.
12. In wash bays, steam treat or rinse off vehicle with clean water.
13. Wash effluent away from vehicle. Do not drive through wash effluent.

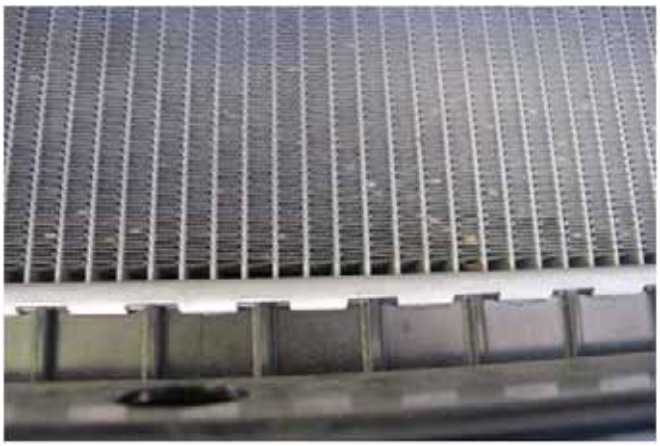
Custom standards

Customised clean down standards may be required under particular management plans or job specifications where the control of a serious weed or pathogen is required. For example, particular disinfectants may need to be applied and greater attention to soil accumulation behind protective plates and covers may be specified. Similarly landholders and managers may require specific clean down requirements.

Sometimes contamination is obvious, other times not so obvious.

An inspection will help you determine if your vehicle or machine requires cleaning. Save time and identify and clean only contaminated parts of the machine.



Vehicle cleandown - the less obvious places weeds hide in, including vehicle radiators

Portable washdown unit

Sump to drain cleandown effluent

Disinfectant Guide (see also the Keeping it Clean manual)

Water disinfection for *Phytophthora* root rot and chytrid frog disease

Water Tankers (fire fighting, cleandown)
Where water for operational activities is bought into *Phytophthora* or chytrid management zones or other areas of native vegetation sensitive to *Phytophthora* the water should be disinfected to prevent the introduction of these diseases. This situation will normally only occur during fire fighting operations where water is drawn from a different catchment.

Disinfection of water is most easily undertaken using a product containing a quaternary ammonium compound (quat) such as benzalkonium chloride (a general name for a variety of different compounds of alkyldimethylbenzylammonium chlorides). Examples include Phytoclean™ or F10™. These products should be used in accordance with the manufacturer's safety instructions and mix rates. The concentration of the mixture can be tested using quat check papers such as Hydrion.

Note: These chemicals should not be mixed with other chemicals. It is especially dangerous to mix chlorine based compounds, eg. chlorine bleach, with any ammonia-based compounds, including quats as toxic vapours can result.

The mixed solution should be allowed to stand a few minutes for disinfection to be completed. Fire fighting need not be delayed as there will be adequate time for disinfection on route to the fire. Where chlorine-based products are used, equipment should be rinsed with fresh water following use as chlorine is corrosive.

Note: Fire fighting foams or detergents will neutralise chlorine treatments. This will not be a problem provided that tanks do not become contaminated with foam or detergent is not added to the tanks to make "wet water". Sterilisation will occur in the tank prior to foam induction.

Clothing and field equipment

Fungicides such as Phytoclean™ or F10™ should be added to washbaths to control the spread of *Phytophthora cinnamomi* or chytrid if:

- sterilising tools used for *P. cinnamomi* or chytrid sampling
- entering or washing down within a *P. cinnamomi* or chytrid management zone
- entering a population of threatened species that is susceptible to *P. cinnamomi*.

DPIPWE (website). **Phytophthora** http://dpipwe.tas.gov.au/biosecurity/plant-biosecurity/pests-and-diseases/phytophthora

Didymo cleaning procedures (Herbourg 2009; NZ Ministry for Primary Industries website):

Removal of plant fragments or dirt should either take place when leaving the site or in a location where run-off is not going into a water body. DO NOT clean the gear with water from the site you are leaving as you might just re-contaminate it, unless you use additional disinfection procedures afterwards. DO clean your gear BEFORE you leave to go to a freshwater area.

Level 1: General disinfection procedures followed whenever possible as you move to a new site:

- When leaving a waterbody, remove any visible plants and animals from your gear and boat.
- Remove any mud and dirt since they might contain Didymo
- Eliminate water from any conceivable item before you leave the visiting area

Level 2: Field gear disinfection procedures:
To disinfect your waders, nets, sieves, buckets, floats, gloves, etc., use **ONE** of the following procedures. Make sure that all parts of the equipment get fully submerged or soaked for the whole time period required:

Non-absorbent items

Submerge all gear in hot water (45ºC plus - uncomfortable to touch) for at least 20 minutes, or until soaked through.

OR

Soak in a 2% solution of household bleach for 1 minute (one small cup or 200mls with water added to make 10 litres)

OR

Soak or spray all surfaces for at least one minute in 5% dishwashing detergent or nappy cleaner (two large cups or 500mls with water added to make 10 litres);

Absorbent items

Felt-soled waders or other absorbent materials need to soak (45ºC plus) for 45 minutes

Hot water plus detergent: soak for 30 minutes in hot water kept above 45 °C containing 5% dishwashing detergent or nappy cleaner;

OR (non-absorbent or absorbent items)

Freeze all gear until solid (> 4hrs)

***NOTE – bleaches are not always appropriate as they can be corrosive on some materials and require rinsing because they foam.**

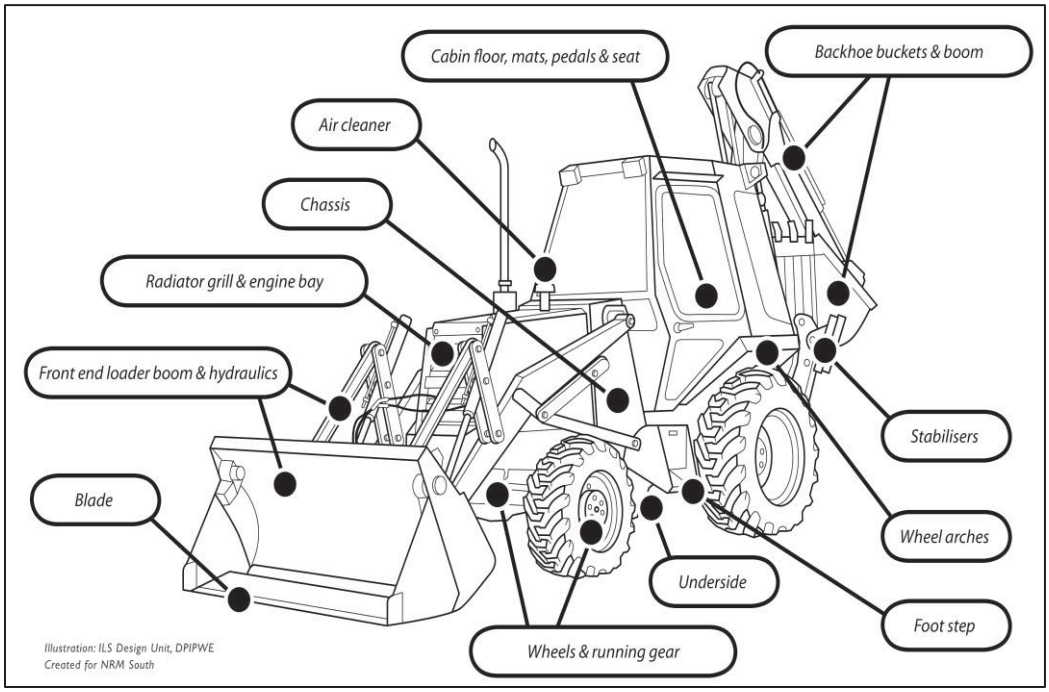
There are a number of commercial disinfectant products that will kill Didymo and are being used in sensitive areas in Tasmania, these include:

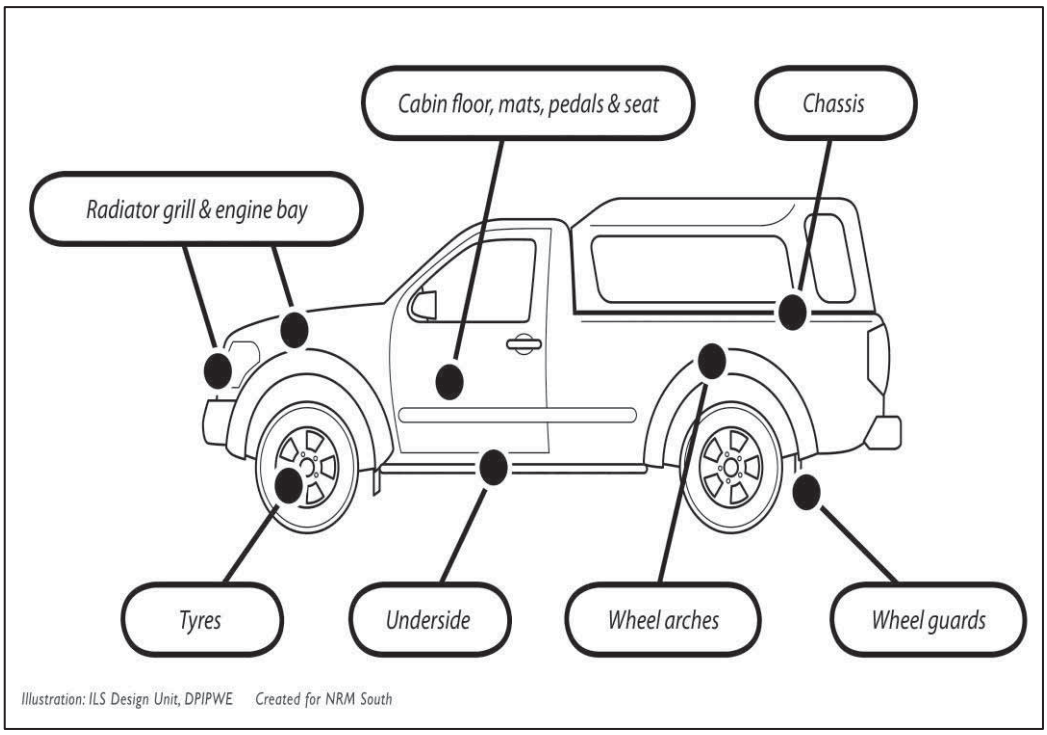
Phytoclean® at a 2% solution or F10® Super Concentrate at a 1% solution. Check the Material Safety Data Sheets to check that they are suitable for the intended use. For further information refer to the *Keeping It Clean* manual.

***NOTE - this advice is intended for didymo. The measures listed here may not be effective for other invasive aquatic pests.**

Cleandown check lists for specific vehicles and machinery

(Based on:
Far North Coast Weeds (NSW) Machinery and Vehicle cleandown checklist;
Queensland Dept. Natural Resources - Queensland checklist for Inspection Procedures)





Examples of cleaning points - Excavator and 4wd **(source: Keeping it Clean manual)**

CLEANING/INSPECTION LIST FOR UTILITY/4WD				
Date:		**Site:**		
Vehicle:		**Registration/ID:**		
Area	**Contamination point**	**Inspected**	**Cleaned**	**Method**
Engine bay	Front grill			
	Radiator and other cooling cores or fins			
	Grill or recess under wipers			
	Engine mounts			
	Top of gearbox			
	Battery recess/tray			
	Any recesses on engine or manifold			
	Air cleaner (including element)			
Cabin	Footwells			
	Carpets and mats			
	Seats			
	Tool boxes			
	Air vents			
Wheels and arches	Tyre treads			
	Rims and wheel caps			
	Wheel arches			
	Mud flaps and brackets			
	Brakes			
Tray	Body of tray (especially any recesses)			
	Mats and toolboxes			
	Around fuel tank caps			
Under carriage	Chassis rails			
	Struts and stabilisers			
	Steering components			
	Axels and differentials			
	Spare tyre and mounts			
	Guards			
	Fuel Tank			
Attachments	Bull bar			
Cleaning method: Mechanical (M), Compressed Air (CA), Vacuum (V), High Pressure Water (HPW), Low Pressure Water (LPW)				
Inspected by:		**Signature:**		
Cleaned by:		**Signature:**		

CLEANING/INSPECTION LIST FOR AN EXCAVATOR				
Date:		**Site:**		
Vehicle:		**Registration/ID:**		
Area	**Contamination point**	**Inspected**	**Cleaned**	**Method**
Engine bay	Engine bay floor			
	Fan shroud and radiator cores			
	Air filters (shake/tap filters to determine if clean)			
	Glacier plate (near radiator)			
Cabin	Footwells			
	Carpets and mats			
	Seats			
	Tool boxes			
	Air vents			
Excavation body	Hollow section chassis channels			
	Channels for hydraulic hoses from driven motor			
	Counterweight void spaces			
	Removable track adjuster guards and lubrication points			
	Turret pivot area			
	Arms/booms - pivot points			
Bucket/Blade	Between teeth of adapters			
	Wear plates			
Rear blade (Stabiliser)	Wear plates			
	Hollow section arms			
	Hollow section blade			
Cleaning method: Mechanical (M), Compressed Air (CA), Vacuum (V), High Pressure Water (HPW), Low Pressure Water (LPW)				
Inspected by:		**Signature:**		
Cleaned by:		**Signature:**		

CLEANING/INSPECTION LIST FOR TRACK TYPE DOZERS				
Date:		**Site:**		
Vehicle:		**Registration/ID:**		
Area	**Contamination point**	**Inspected**	**Cleaned**	**Method**
Engine	Check radiator core and engine area for residues.			
	Remove and check the air filter/cleaner (these often require destruction where they are clogged with QRM).			
	Check carefully the void space between the oil and radiator cores.			
	Battery Box - Lift/remove the battery to check for contamination (battery box may be at side/rear or under seat).			
Drivers cab	Check externally under and around driver's cab.			
	Check under mats in cab.			
	Remove/lift seat; remove/lift floor pans to allow checking to top of transmission.			
	Check air conditioner filter (if fitted) – shake/tap filter to check if clean			
	Check externally under and around driver's cab.			
	Check under mats in cab.			
Body	Belly plates should be removed to allow inspection and cleaning			
	Rear plates at back of dozer should be removed to allow inspection and cleaning.			
	Hydraulic cover plates should be removed to allow inspection and cleaning.			
Tracks/track frame	Examine tracks carefully.			
	Ensure inspection/cover plates are removed to allow inside track area.			
	Check idler wheels (these support the tracks).			
Fuel cells	Are removable therefore dirt etc can pack between the tank and the frame.			
Blade	Ensure that edge of blade top/bottom is not split – this allows soil to be packed very tightly in the hollow.			
	Check cutter points/wear blades.			
	Check carefully the pivot points and adaptors at the rear of the front blade – these allow the blade to change height and angle. Sometimes soil has compacted and is difficult to dislodge.			

Area	Contamination point	Inspected	Cleaned	Method
	Check trunction arms			
	Check all hollow sections			
Ripper support frame is usually hollow	Check carefully if any contaminants have entered this section. The tynes may need to be removed.			
Tynes	Tynes need careful inspection. Contamination may often be removed by water blasting, but tynes may need to be removed in some cases.			
Ripper points	A pin holds on the ripper points. Dirt can compact under the ripper points.			
All areas	Check if any sections or channels are hollow and determine if there is a possible entry point for contamination. Check if plates are covering a compartment or space that may have collected dirt/trash.			

Cleaning method: Mechanical (M), Compressed Air (CA), Vacuum (V), High Pressure Water (HPW), Low Pressure Water (LPW)

Inspected by:		**Signature:**	
Cleaned by:		**Signature:**	

CLEANING/INSPECTION LIST FOR WHEELED LOADERS & COMPACTORS				
Date:		**Site:**		
Vehicle:		**Registration/ID:**		
Area	**Contamination point**	**Inspected**	**Cleaned**	**Method**
Engine and running gear	Air cleaner and air filters			
	Air conditioner unit			
	Under and around removable fuel cells			
	Brake assemblies			
Canopy/cabin	Hollow channels			
	Void space between cab and body (bird's nests have been found here)			
	Footwells			
	Carpets and mats			
	Seats			
Body	Feet of adaptors on compactors			
	Hydraulic points			
	Articulation points of hydraulics			
	Counterweight void spaces			
	Between dual wheels			
Bucket/Blades	Blade wear plates			
	Blade teeth and adaptors			
Cleaning method: Mechanical (M), Compressed Air (CA), Vacuum (V), High Pressure Water (HPW), Low Pressure Water (LPW)				
Inspected by:		**Signature:**		
Cleaned by:		**Signature:**		

CLEANING/INSPECTION LIST FOR DUMP TRUCKS				
Date:		**Site:**		
Vehicle:		**Registration/ID:**		
Area	**Contamination point**	**Inspected**	**Cleaned**	**Method**
Engine and running gear	Air cleaner			
	Air conditioner unit			
Cabin	Footwells			
	Carpets and mats			
	Behind and under seats			
	Tool boxes			
	Air vents			
Body	Hollow channels in tray frame			
	Between dual wheels (where applicable)			
Cleaning method: Mechanical (M), Compressed Air (CA), Vacuum (V), High Pressure Water (HPW), Low Pressure Water (LPW)				
Inspected by:		**Signature:**		
Cleaned by:		**Signature:**		

Useful Resources and References

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Mapping Weeds

Atlas of Living Australia: http://www.ala.org.au/

Department of Primary Industries, Parks, Water and Environment – Natural Values Atlas (new users can register at site): https://www.naturalvaluesatlas.tas.gov.au/

McNaught, I., Thackway, R., Brown, L. and Parsons M. (2006). A field manual for surveying and mapping nationally significant weeds. Canberra, Bureau of Rural Sciences. http://www.weeds.org.au/docs/Weeds_Manual_body.pdf

Strategies

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Temple-Smith, R. (draft). Southern Tasmanian Weed Strategy - Southern Tasmania Natural Resource Management Region 2011-2016: http://www.nrmsouth.org.au/wp-content/uploads/2014/10/southerntasmanianweedss.pdf

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Websites

Department of Primary Industries, Parks, Water and Environment
Declared Weed Information – legislation, weed identification and control options: www.dpipwe.tas.gov.au/weeds

Department of Primary Industries, Parks, Water and Environment
Plant Biosecurity Manual: http://dpipwe.tas.gov.au/biosecurity/plant-biosecurity/plant-biosecurity-manual

Ministry for Primary Industries - Information on didymo including cleaning equipment: www.biosecurity.govt.nz/pests/didymo

Tasmanian Legislation Online – *Weed Management Act* and Regulations as well as other relevant legislation. http://www.thelaw.tas.gov.au

Weeds Australia
Home of the national weed strategy: www.weeds.org.au

Weeds Australia
Weeds of National Significance Best Practice Manuals. http://www.weeds.org.au/WoNS/

Weeds Cooperative Research Centre (CRC) guides and factsheets. http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/publications/weeds-crc-pubs

Glossary

Control: involves actions to remove a weed infestation or to contain it and prevent spread to other areas.

Containment: preventing a weed or disease from spreading to a new area, perhaps with quarantine measures enforced in order to prevent further spread. Containment may be an adjunct to or an approach used in an eradication campaign.

Declared weed: Plant species that is declared under the *Tasmanian Weed Management Act 1999.*

Developments or works: activities that may result in disturbance to the land, including major development projects, subdivisions, road construction, quarries, and infrastructure construction for irrigation, dams, power, telecommunication and water supply. These developments can occur on either public or private land.

Disease: is the result of an infection by a pathogen that adversely affects an organism. Examples include dieback (*Phytophthora cinnamomi),* fire blight on fruit (*Erwinia amylovora*), chytridiomycosis or chytrid frog disease (*Batrachochytrium dendrobatidis*), myrtle rust (*Puccinia psidii*).

Environmental weed: Plant species that have an adverse impact on the environment, including native flora and fauna.

Eradication: the elimination of a weed incursion species from an area. Eradication requires that the seed bank is eliminated and the species is no longer being detectable.

Establishment: the weed incursion species persists, for the foreseeable future, within any area and where it is not feasible (whether in terms of technical feasibility or a cost: benefit analysis) to eradicate the weed species.

Incursion: the detection of a species in a place where it has not previously been found.

Infested area: declared under the *Weed Management Act 1999* to prevent the spread of a weed into a new area. Includes powers to control access and movement.

Invasive species: an exotic species that establishes a wild population and spreads beyond the place of introduction and becomes abundant.

Native species: a species found within its native range (in Australia this means that it is indigenous to Australia).

Naturalised species: a species with a free-living self-sustaining population outside its native range.

Pathogen: a living microorganism such as bacterium, virus or fungi that causes diseases in plants and animals. Examples include *Phytophthora cinnamomi*, *Puccinia psidii (*myrtle rust), *Erwinia amylovora (*fire blight) and *Batrachochytrium dendrobatidis* (chytrid frog disease).

Propagule: spores, seeds, fruits or vegetative parts capable of producing a new plant.

Quarantine area: established under the *Plant Quarantine Act 1997* in order to prevent the spread of a pest to new areas. Includes powers to control access and movement.

Rehabilitation: actions that seek to quickly repair damaged ecosystem function, particularly productivity. Indigenous species and ecosystem structure and function are the targets for rehabilitation.

Weed: a plant (or plant like organism eg. algae) that requires some form of action to reduce its harmful effects on the environment, economy, human health and/or amenity.


KEEP TASMANIA FREE OF WEEDS, PESTS AND DISEASES