

ADVISORY NOTE



WEED MANAGEMENT ON MINE SITES

This advisory note outlines the steps required to effectively manage weeds on mine sites.

Introduction

Environments affected by mining are usually highly susceptible to invasion by weeds, as disturbances to soils caused by mining operations provide an ideal habitat where weeds can readily colonise and quickly become the dominant vegetation. If not controlled appropriately, weed infestations on a mine site can have an increased risk of spreading to adjacent areas that may be free of weeds or have lower densities and/or less weed species.

Another key risk that weeds pose on mine sites is during rehabilitation, where weed infestations can compete directly with native or selected revegetation species and increase the risk of fires that may damage revegetated areas.

Environmental weeds can be defined as 'those plants that adversely affect the integrity, conservation value or biodiversity of natural ecosystems' (Anon 1997).

Weeds have the potential to substantially change the dynamics natural ecosystems by:

- Competing with or displacing native plant species.
- Affecting natural processes such as fire intensity, stream flows and water quality.
- Changing habitats and therefore impacting on ecosystem health (Smith 2002).

Mine operators have both a legislative requirement and an environmental responsibility to effectively manage weeds on their leases.

The objectives of this Guidance Note are to provide mine operators with information on their obligations from a legislative perspective and present best-practice approaches to the management of weeds on their lease(s). It is recommended that mine operators develop their weed management program in consultation with their Regional Weeds Officer (Department of Natural Resources, Environment and the Arts) and utilise information on the following website:

<http://www.nt.gov.au/nreta/natres/weeds/index.html>

Legislation

The primary legislation relating to weed management on any land in the NT (including mine sites) is the *NT Weeds Management Act, 2001*. Some key requirements under Section 9 of the Act include:

- (1) *The owner and occupier of land must –*
 - (a) *take all reasonable measures to prevent the land being infested with a declared weed;*
 - (b) *take all reasonable measures to prevent a declared weed or potential weed on the land spreading to other land; and*
 - (c) *within 14 days after first becoming aware of a declared weed that has not previously been, or known to have been, present on the land, notify an officer of the presence of the declared weed.*
- (2) *The owner and occupier of land on which a declared weed or potential weed is present must comply with a weed management plan relating to the weed.*
- (3) *The owner and occupier of land on which a potential weed is present must dispose of the weed only on the land or at a designated weed disposal area.*
 - (4) *A person must not, except in accordance with a permit –*
 - (a) *bring a declared weed or take part in, or be responsible for, bringing a declared weed into the Territory;*
 - (b) *propagate or scatter a declared weed;*
 - (c) *sell or offer to sell a declared weed or any thing that contains or carries a declared weed;*
 - (d) *hire any equipment, device or thing that contains or carries a declared weed or potential weed;*
 - (e) *purchase or offer to purchase a declared weed or any thing that contains or carries a declared weed;*
 - (f) *store, grow or use a declared weed or any thing that contains or carries a declared weed; or*
 - (g) *transport or carry on his or her person a declared weed or anything that contains or carries a declared weed.*

Under the Weeds Management Act, weeds are divided into the following classes:

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|----------|------------------------------------|
| Class A: | To be eradicated |
| Class B: | Growth and spread to be controlled |
| Class C: | Not to be introduced |

Details of which weed species belong to which classes and other information regarding the Weed Management Act can be sourced from the following website:

<http://www.nt.gov.au/nreta/natres/weeds/legislation.html>

General principles of weed management

Weed management implies careful use of various control methods with the aim of decreasing the harm caused by weeds on the environment and industry, to a level that is economically acceptable.

Weed management is a component of sustainable land management by individual landholders and the community and to be effective, weed management must be long term.

There are several principles of weed management as outlined by the Northern Territory Weeds Management Strategy (1996-2005):

- Landholders and land users are responsible for weed management.
- Weed management is an integral part of all land management.
- Preventing initial introduction and spread is the best and cheapest form of weed management.
- When introduction does occur, early detection followed by swift action is the essence of successful weed management.
- Weed management requires a continuous, long term commitment.
- The integration of control methods including physical, chemical, ecological and biological can achieve best weed management.
- Cooperative weed management amongst landholders and land users on a catchment basis is recommended and supported.

Components of a weed management program



There are 4 main steps required for effective weed management. Each step is explained in further detail in this section.

Step 1: Assess the situation – weed mapping

The first step in managing weeds is to assess the current situation, which involves gathering information on which species are present and where they occur on a property. This will ensure that when planning is being undertaken, priority species and areas will already be identified. The best way to map weed infestations is to undertake a field survey using a Global Positioning System (GPS) to accurately record the locations of weed species present. Useful information (attribute data) that should be collected while surveying includes:

- location (GPS);
- weed species present;
- density (e.g. based on percentage cover); and
- area of infestation (e.g. hectares).

There are field computer hardware (e.g. 'palmtop') and software (e.g. Geographic Information System; GIS) packages available that allow accurate and efficient location data to be collected simultaneously with attribute data. This can then be imported into a desktop GIS to produce maps and accurate information on areas (e.g. hectares) infested with individual weed species.

Step 2: Develop a weed management plan

a) Set objectives and targets

The plan should contain both objectives and targets. Objectives include general statements (e.g. 'implement weed control activities'), whereas targets are specific and measurable (e.g. 'reduce area of infestation of species x by y percent'). Objectives and targets will be based on the prioritisation of weed infestations, outlined in the sections below.

b) Prevent the introduction and spread of weeds

A weed management plan should include measures that will be implemented to prevent the introduction and limit the spread of weeds. Examples of such measures include:

- appropriate standards of hygiene e.g. inspection of earthmoving equipment entering site, vehicle wash down facilities, etc;
- early detection and eradication of 'satellite' outbreaks;
- implementation of quarantine measures e.g. 'no-go' areas with dense infestations; and
- education and awareness for employees and contractors.

c) Prioritise weed control activities

Weed control activities should be prioritised to maximise the use of the resources allocated. Examples of general factors to consider when prioritising weed control efforts for a particular species include:

- weed invasiveness (consult literature & Regional Weeds Officers);
- effect on environment (consult literature & Regional Weeds Officers); and
- weed classification under Weed Management Act (e.g. Class A weeds higher priority);

Examples of specific factors to consider when prioritising individual areas of infestation include their:

- proximity to roads/tracks (e.g. infestations close to tracks get high priority);

- phase of invasion (e.g. early stages can be controlled more easily, so get high priority);
- size of infestation (e.g. smaller infestations can be controlled more easily);
- proximity to drainage lines (e.g. infestations close to drainage lines more likely to spread);
- susceptibility to wind dispersal (e.g. weeds growing in elevated areas or weeds with light seeds more likely to disperse); and
- proximity to lease boundary (e.g. weeds close to boundary get higher priority).

d) Outline weed control methods

Weeds can be controlled by chemical (i.e. herbicide), physical (e.g. hand pulling), fire and/or biological (e.g. biological control agents) methods. Optimal methods vary from one species to another and may change over time with weed research and/or new chemical products, therefore Regional Weeds Officers from the NT Department of Natural Resources, Environment and the Arts should be contacted for up to date information.

e) Other considerations

Resources and logistics are also factors that should be taken into account when writing a weed management plan. For example, resources to be dedicated to weed control in the following year should be detailed, such as whether they will be undertaken by on-site staff or contractors, the time/cost commitment for this and equipment to be used. A logistical challenge that often needs to be taken into account when planning weed control activities is accessibility (e.g. difficult in wet conditions) and optimal timing of weed control (e.g. several species may need treatment at the same time of year).

Once weeds are controlled in an area, it would be ideally recolonised by native plant species, rather than re-infestation by weeds from adjacent areas. Mine operators should therefore consider active revegetation with native plant species or those species designed to meet the pre-agreed beneficial end land use.

Step 3: Implementation of plan

Implementation of a weed management plan should ideally be coordinated with adjacent landholders to maximise the effectiveness of weed control measures. For example, costs can be reduced by sharing resources (e.g. spraying equipment, costs to mobilise weed spraying contractors) and timing of weed control activities should be coordinated.

When undertaking weed control measures (e.g. spraying with herbicide), take notice of weather conditions. For example, strong winds can hinder herbicide application and rainfall can reduce herbicide effectiveness. The timing of control with respect to plant life cycles is also very important and this may vary from one weed species to another. For example, it is best to apply herbicide when plants are actively growing and prior to the commencement of seeding.

The effectiveness of weed control efforts should be checked and documented soon after treatment. This information will be important during *Step 4: Monitor and review* to ensure that the methods and timing of control are optimised in future years.

Mine operators should also ensure that staff/contractors have a safe working environment. Herbicides are sometimes highly toxic and appropriate personal protective equipment should be provided and used, as directed on the container label and/or Material Safety Data Sheets (MSDS).

Step 4: Monitor and review

A weed management plan should be a living document- it should be reviewed regularly (e.g. annually), so that the effectiveness of control measures can be assessed and new priorities incorporated (e.g. new species). Weed classifications under the Weed Management Act may change periodically, as well as knowledge of individual weed species and methods of control.

Questions that should be asked during the review process include:

- Did you achieve your goals e.g. were they too ambitious, too conservative, realistic? Was there a difference in results for different areas?
- Do resources need to be increased or decreased?
- What were the benefits?

Mapping of weed infestations will also need to be repeated periodically to assess the success of current weed management practices and re-prioritise weed control efforts as appropriate.

References & Further Information

Anon (1997) The National Weeds Strategy: A Strategic Approach to Weed Problems of National Significance. Commonwealth of Australia, Canberra

Smith (2002) Weeds of the Wet/Dry Tropics of Australia- A Field Guide, Environment Centre NT.

NRETA (2008) Weeds, at <http://www.nt.gov.au/nreta/natres/weeds/index.html>

For further information or advice on this subject please contact

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