



# Machinery Hygiene Guidelines for Roadside Managers

Minimising the Spread of Chilean Needle Grass

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## FORWARD

Many concerns have been raised about the spread of Chilean Needle Grass (CNG). It has been widely acknowledged that CNG, one of the twenty weed species listed as “Weeds of National Significance” (WONS) is spread via contaminated machinery, commonly used by roadside managers. Roadsides provide corridors that allow CNG to be transported vast distances on machinery and vehicles. This provides the means for CNG to establish and spread on both public and private lands.

Machinery utilised for roadside management often travels vast distances and is not restricted to roadsides, which allows CNG to disperse elsewhere. Once established this species can quickly out-compete desirable agricultural and native species. It has been projected that CNG could infest vast tracks of land in southeastern Australia, with Victoria and New South Wales being worst affected.

The implementation of machinery hygiene guidelines, as part of an integrated control program, will help minimise the spread of CNG along roadsides and on adjoining lands.

The following report aims to provide roadside managers with a set of guidelines to minimise the spread of CNG as well as many other pest plants and pathogens.

## 1. IMPACTS ON PRIMARY INDUSTRY

Machinery hygiene guidelines are essential to help land managers minimise the spread of CNG. Exotic stipoid grasses such as CNG have the ability to out-compete native grasses, adversely affect primary industry. Desirable pasture species can also be displaced, whilst fleece can become contaminated and hides damaged by the seeds. The sharp panicle seeds of CNG can also affect livestock health. These seeds have been known to lead to blindness in sheep and cattle and have been the cause of abscesses. Crop management costs are also increased as a result of CNG contamination.



**Figure 1. Agricultural land heavily infested with Chilean Needle Grass**

## 2. MODES OF SPREAD

CNG seed is spread by a variety of ways, ranging from movement of contaminated soil, rocks, fodder and livestock. It is widely accepted amongst land managers that CNG dispersal is assisted by machinery, especially machinery used for agricultural and roadside maintenance.

Roadsides are particularly vulnerable to invasion by weeds, such as CNG, as they are subject to regular disturbance such as slashing, grading and earthworks. The physical characteristics of the seed, as well as the plant's morphology also aid its dispersal.



**Figure 2. Roadside maintenance such as slashing can contribute to weed dispersal.**

### 3. PHYSICAL CHARACTERISTICS OF CNG SEEDS

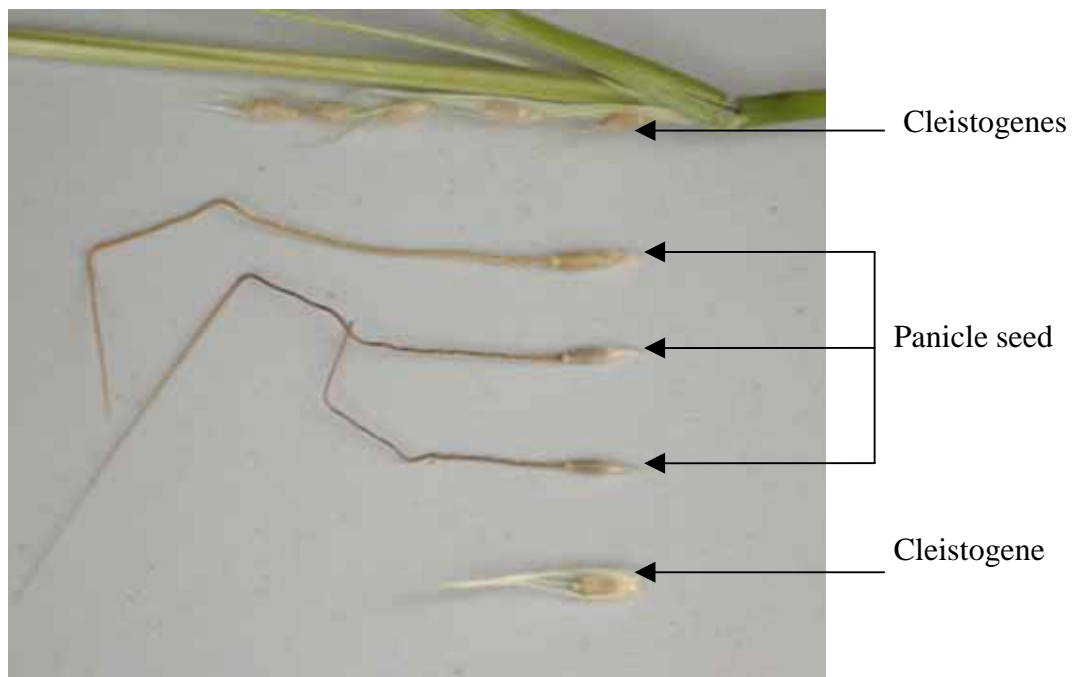
The panicle or aerial seeds of CNG have an extraordinary ability to adhere to machinery. As its name suggests, the plant has seeds, which have needle-like tips, allowing them to penetrate and attach to objects. The corona, a ring of hairs around the seed base, aids dispersal. These hairs act like barbs and prevent seed dislodging once attached to objects.



**Figure 3. Panicle seeds**

The awn, a long bristle like attachment located at the end of the panicle seed, also assists dispersal. Through wetting and drying periods, the awn is able to secure the seed onto objects or into the ground by twisting and gyrating.

Cleistogenes or 'hidden stem seeds', located at nodes of flowering stems provide another form of seed production. These seeds can be produced even if panicle seed production is suppressed. Plant debris found on machinery can contain both seed types.



**Figure 4. Chilean Needle Grass seed comparison**  
**Photo Courtesy: Charles Grech**

#### **4. EDUCATION AND AWARENESS**

Community education and awareness programs play a pivotal role in preventing the spread of CNG. It is important that land managers and their employees are familiar with the appearance of CNG and its ecology. Due to its resemblance to native grasses, land managers have often been unaware of its presence until it has reached the 'swarding' stage, when it forms dense infestations. Through knowledge and skills that enable early detection, land managers have the ability to manage CNG infestations more effectively.

**The following actions should form part of education and awareness raising program:**

- All levels of management from planners through to on ground staff (ie. Contractors) should be familiar with CNG identification, locations of known infestations and machinery hygiene protocols;
- Information sessions should be conducted annually;
- Induct/ train staff in best management practices;
- Liaise with on-ground staff and property managers to determine clean-down locations, new CNG infestations and significant vegetation; and,
- Encourage all land managers to participate and contribute to awareness raising through regularly reporting new infestations.



## **5. MAPPING AND MONITORING**

Monitoring infestations is an important tool to evaluate project success, as well as the extent and location of infestations. Through the use of mapping technologies such as Global Positioning Systems (GPS) land managers are able to record infestations and monitor dispersal. It is crucial that some form of recording and monitoring be undertaken in order to implement machinery hygiene protocols. Locations of clean down areas can be determined by the use of maps, whilst monitoring can help determine the effectiveness of machinery hygiene routines.

As CNG can be difficult to identify to the untrained eye, locating and mapping flowering infestations can assist management programs at other times of the year. These records can assist land managers predict new infestations, as well as protect valuable areas such as significant roadside vegetation.

## **6. TIMING AND COORDINATING WORKS**

Planning roadside works is necessary to minimising the spread of CNG. When planning, particular attention should be given to the timing of actions. Often roadside maintenance works, such as slashing, have been undertaken to minimise fire risks at times when regrowth will be negligible. Unfortunately this has resulted in roadsides being slashed after the main spring/summer flush of flowering and subsequent seeding of CNG.

By coordinating works, infestations can be managed more effectively. Projects such as slashing and earthworks should undertaken prior to the main flowering periods. Land managers will therefore be required to pay particular attention to the growth habits of local CNG infestations and weather conditions. Under various situations (ie. topography, soil or rainfall), CNG infestations may act differently compared to those found elsewhere. In some regions, CNG will flower autumn and in late spring and again in early summer. While elsewhere, CNG may flower continuously where sufficient rainfall occurs.

Time efficiency and employee productivity can be maintained, while undertaking hygiene procedures. For instance, by undertaking works in clean areas first then gradually working towards infested areas, the number of times and level of clean down procedures can be reduced.

**The following actions need be considered when coordinating works to minimise machinery contamination:**

- Minimise movement of machinery through CNG infestations during peak flowering periods;
- Ensure that machinery operators are familiar with CNG identification and machinery hygiene programs occur prior to main flowering periods;
- Commence works in clean areas and progressively work towards infestations; and,
- If possible, undertake CNG control programs prior to commencing work.

## **7. CONTRACTS**

When employing personnel to undertake roadside maintenance, contractual agreements are often entered. Employers can stipulate a number of regulations within these contracts in relation to machinery hygiene.

**The following points could be incorporated into contracts:**

- Contractors must demonstrate how high levels of machinery hygiene will be maintained eg. submit machinery hygiene plan with tender;
- Machinery must be clean prior to and after entering designated areas (eg. clean or infested zones);
- Contractor must undertake clean down procedures at nominated points along roadsides;
- Contractors must provide proof of clean down procedures eg. bagged clean down material left at nominated site;
- Contractors must gradually work from clean areas to infested areas; and,
- Contractors must be able to identify CNG.

**For further details regarding contracts refer to Appendix 1.**

## 8. MINIMISE INITIAL CONTAMINATION

Machinery operators have direct influence over initial points of contamination. Although contamination cannot be completely eliminated, operators can make decisions that can determine the level and time required to undertake machinery hygiene procedures

### **Actions that may prevent initial contamination include:**

- Avoid operating in weed infested areas;
- Time and coordinate works prior to seed set, especially at peak seeding times (usually in late autumn and summer);
- Work from clean areas into infested areas;
- Adhere to formed tracks and roads where practical;
- Avoid work during inclement weather (eg. minimise work during and immediately after rain, as this reduces the chances of wheel rutting);
- Use the most appropriate machinery for the job to minimise soil disturbance (eg. use a boom slasher with an extendable hydraulic arm and rollers can minimise scalping if used correctly);
- Ensure that staging grounds and stockpile sites are located in CNG free areas to minimise machinery contamination;
- Ensure that roadside material such as soil and gravel is free of CNG seed. Seek a vendor declaration to guarantee clean status;
- Strategically designate clean down sites to minimise weed spread;
- Ensure machinery operators are familiar with hygiene protocols and weed identification; and,
- Map and monitor CNG infestations. Regular mapping can help to identify infestations and determine the location of clean down sites.

## 9. STAGING GROUNDS

'Staging grounds' are areas designated for storage for roadside machinery, often referred to as work depots. They are also utilised for maintenance; refuelling and machinery clean down procedures.

Staging grounds should be strategically located in weed free areas to minimise weed dispersal, maintain machinery hygiene and reduce accidental spread to and from works sites. If this is not practicable, the nominated site should have the topsoil, which may be contaminated with CNG seed; scraped and stockpiled for later remuneration works after the project has ceased. An additional layer of gravel to the staging ground can also help maintain machinery hygiene, especially during wet conditions.

To protect staging grounds from weeds, regular inspections and control works should be undertaken. Particular attention should be given to those areas where machinery hygiene procedures are conducted. CNG seeds and plant debris are readily transported on machinery and can become dislodged during these procedures.



**Figure 5. CNG infested staging ground**

## 10. STOCKPILE SITES

Material used for roadside maintenance should preferably be stockpiled at the staging ground to prevent contamination. Locating stockpiles in weed-free areas can assist in maintaining machinery hygiene as well as prevent new infestations. Regular inspections of stockpiles should be routinely carried out to ensure that these areas are not encroached on by CNG or other pest plant species.

### Best practice standards for storing material should include:

- Clearly define stockpiles and prepare the site as for staging grounds.
- Construct permanently contained areas for long-term projects (eg. concrete bays).
- Cover stockpiles (eg. with shade mesh or a tarp) to protect against contamination.
- Acquire stockpiled material (eg. gravel, soil, rock and sand) from a weed free source.
- Regularly inspect stockpile and control weed infestations



Figure 6. Stockpile infested with weeds

## 11. CHOOSING MACHINERY

Using the most appropriate equipment for the job may minimise roadside disturbance and maintain machinery hygiene. Use of inappropriate machinery may also result in poor quality work (eg. uneven grass cutting, scalping or rutting).

Hydraulic components on machinery may minimise roadside disturbance and machinery contamination. In circumstances where the ground is uneven a boom slasher with hydraulic arms and rollers should be utilised when slashing to help prevent scalping. The boom slasher has the ability to float over uneven ground, preventing excessive mud and plant debris adhering to the slasher.

Consideration should be given to the size of machinery required. Machinery should be as small as most appropriate to minimise the chances of wheel rutting. On heavy machines, large flotation tyres can be used to minimise ground compaction and bogging.

## 12. CLEAN DOWN AREAS

Areas should be nominated along roadsides where clean-down procedures can be undertaken after adequate public consultation.

Roadside managers, especially those who undertake on ground works should be liaised with to ensure that the nominated clean-down points are practical and widely accepted, thus increasing their use. Mapping technologies should be utilised to record clean-down points and infestations to assist identification for on ground staff.

Consideration should be given to a variety of factors before determining clean-down sites. The quality of the overall roadside vegetation should be considered as large areas of significant native vegetation can be found on roadsides. Such areas require protection from disturbance resulting in weeds invasions. Clean-down points should therefore, be located outside of these significant areas to ensure a high standard of machinery hygiene before moving into these areas.

The type of machinery and the nature of the project are other factors that need to be addressed when determining the location of clean-down points. Larger projects, which require excavators and other earthmoving equipment, may require a portable deluge facility to undertake clean down procedures. These facilities may need large areas to undertake hygiene procedures in comparison to smaller projects such as roadside grass maintenance (eg. slashing).

Long-term projects such as roadside construction may be able to locate clean-down facilities at works depots, where more elaborate cleaning facilities can be established (eg. wash-bay).

Roadside slashing requires a different approach. As it involves travelling large distances and has direct contact with CNG, machinery can become heavily contaminated with plant material. Key areas such as radiators, chains on slasher attachments and the chassis become severely contaminated with seed. To minimise this, numerous strategically located clean-down points need to be established. They should be clearly marked or signed to help direct operators where to undertake procedures. The use of GPS and other mapping technologies can also assist in locating clean down points.

**When designating clean down areas, land managers should ensure the following:**

- Clean down zones be located in low value area (eg. away from significant vegetation, however close to existing CNG infestations).
- The designated area provides safe conditions for operators to undertake clean down procedures (eg. highly visible to road traffic and on solid flat ground to maintain machinery stability).
- Clean-down points do not contribute to further machinery contamination. To prevent this, gravel could be used to minimise contact with mud and aid drainage.
- Excessive run-off from wash-down procedures does not occur.
- Clean down areas are clearly posted.
- Adjoining landowners and the public are sufficiently consulted during the planning stage.



**Figure 7. Clean/ wash down sign**

**Photo: Charles Grech**

## 13. MINIMISING SOIL DISTURBANCE

Soil disturbance directly influences machinery hygiene and promotes ideal conditions for CNG and other weeds to establish, as well as assisting the spread plant seed and debris. Disturbance creates favourable conditions for weeds and opens up niches by reducing competition with desirable species.

Transporting contaminated machinery from one site to another often results in clods of mud falling off onto the road and roadside. This not only aids in the dispersal of weeds such as CNG, but also poses serious road safety issues as falling material can endanger other road users.

### **Machinery operation during inclement weather can result in the following:**

- Degradation of valuable roadside vegetation.
- Reduced quality of work ie. grass may not cut as readily or evenly when slashed.
- Places strain on machinery, increasing maintenance and operation costs and requirements.
- Can pose a serious occupational health and safety issue as the chances of machinery slipping or over turning maybe increased.

### 13.1 Roadside Maintenance

Roadside maintenance activities often require machinery to travel vast distances and can directly impact on weed spread. There are a number of precautions that can be implemented by roadside managers to minimise CNG rate of spread, whilst protecting and maintaining valuable roadside vegetation and addressing machinery hygiene.

#### **Regular roadside maintenance can:**

- Prevent machinery coming in contact with large amounts of plant material (eg. panicle seeds can penetrate deep into machinery components).
- Improve roadside visual appearance.
- Decrease fire risks as the amount of fuel is reduced.
- Increase visibility, which improves road safety.

#### **Employ staff who:**

- Are familiar with machinery hygiene protocols.
- Demonstrate a high degree of understanding of environmental care and skill using such machinery.
- Can minimise environmental damage (eg. rutting and scalping) which can directly influence the level of machinery hygiene.



## 13.2. Scalping

When slashing roadsides, machinery operators should be mindful of the changing contours of the roadside and not cut too close to the ground. This is often referred to as 'scalping'. Scalping creates ideal conditions for weed growth, disturbing soil and removing competition for resources such as light. Scalping also directly results in machinery, especially cutting implements, becoming contaminated.



Figure 8. Scalped roadside

### 13.3. Rutting

Tyre rutting occurs when wheels on machinery cause excessive soil disturbance. Tyre rutting not only causes environmental damage, but also results in machinery becoming heavily soiled with mud that may contain weed seeds. To prevent spread of any contaminants the level of hygiene clean down protocols will need to be substantially increased.



**Figure 9. Rutting caused by roadside slashing**

## 14. CLEAN DOWN PROCEDURES

Clean down procedures can greatly reduce the spread of CNG. As part of pre-start and post-use machinery inspections, operators should pay particular attention to key areas such as the chassis and wheels, to ensure they are in clean and safe conditions. Damage or potential problems may be identified at these points of time and can be subsequently remedied.

Routine hygiene procedures allow clean down procedure to be implemented with ease, as contaminants are prevented from building up. If machinery becomes heavily soiled, gravel and plant material can become baked on or held fast to surfaces, increasing the difficulty of removal.

### **The following points should be considered when implementing clean down procedures:**

- Ensure machinery is clean of contaminants before and after use.
- To minimise the number of clean down operations, work from CNG free areas into infested areas.
- Utilise clean-down points to undertake clean-down procedures.
- Dispose of contaminated material in an agreed upon manner.
- Ensure that warning signs or other appropriate equipment is used to ensure both operator and the public's safety is maintained during clean-down procedures.
- Ensure that clean-down procedures are undertaken on level ground to prevent machinery becoming unbalanced.
- Ensure that brakes are applied; transmission is neutralised; pins on attachments are locked; hydraulic attachments are lowered to help maintain stability, and engine is disengage etc., to prevent injury to operator.
- The type of clean down required eg. brush, air or water.

## 15. CLEAN DOWN TYPES

The appropriate clean down procedures needs to be determined for the project involved. Often larger projects, that utilise large numbers of machinery and are carried out over an extended period of time, require vastly different clean down procedures. If it is not economically viable for small operators to purchase elaborate clean down facilities, such as deluge systems, it would be reasonable for those companies to purchase equipment that will provide minimum hygiene standards. Otherwise, existing facilities may be utilised.

### The following types of clean down procedures may be utilised:

- **15.1. Manual on site:** is often the most practical and affordable method. Manual clean down procedures may consist of using hand tools such as brushes, brooms, air compressors, vacuums and/or high-pressure water guns. Equipment used for air and water application can be purchased from companies who specialise in supplying car and truck cleaning equipment, listed in the telephone directory. Note: if high-pressure water is utilised, apply as little as practical to avoid run-off.
- **15.2. Wash-bays:** are standing structures that allow machinery to be cleaned using water. These facilities usually capture contaminated water and debris, which is correctly disposed of. It should be noted that these facilities can often be found at state and local government work depots, however permission should be sort before using such facilities.

Commercial enterprises, which are listed in telephone directories, can be utilised. Some of these companies provide services for wash-bay management and installation. Note: if using these facilities, operators have duty of care to prevent contaminants falling or blowing off during transit in order to prevent new infestations and ensure the safety of other road users.

- **15.3. Portable facilities:** can be located in telephone directories. There are many commercial companies that offer car and truck cleaning services. Some of which specialise in providing mobile services that cater for earth-moving equipment such as deluge facilities.

## 16. CLEAN DOWN TECHNIQUES

### 16.1. Washdown



Figure 10. Front-end loader

The application of water, whether at a wash-bay facility or in the field with portable equipment, can remove mud, grime and plant debris and seed.

Particular attention should be given to those areas where contaminants frequently attach. **See Section 16 Key Areas on Machinery**

### 16.2. Physical



Figure 11. Slasher attachment

Brooms, brushes, scrapers, shovels and other hand-tools can assist the removal of contaminants. Often grass, mud and gravel can become firmly attached to machinery proving difficult to remove without the use of hand-tools.

Hand-tools are an inexpensive and portable, enabling operators to undertake clean down procedures in the field.

### 16.3. Compressed Air



Figure 12. Grader

An air-compressor can help decontaminate hard to reach and delicate areas such as filters, engine components and cavities.

Medium-larger machinery used for earthworks and road construction are often fitted with air-compressors.

#### 16.4. Vacuuming



Figure 13. Vehicle interior

The interior of the driver's cabin regularly becomes contaminated with weed seeds; mud and gravel carried on the shoes of operators.

Frequent cleaning can minimise carpets and upholstery becoming heavily contaminated.

#### 17. KEY AREAS ON MACHINERY

There are many key areas on machinery that are prone to contamination, commonly located where mud commonly accumulates during normal operation, for example wheels and tracks on tractors. However, there are many other less obvious areas that can become contaminated with CNG seed and plant debris. Joints and fasteners, such as nuts and bolts, frequently become encased in mud. Seed and dust are often trapped in engine components such as radiators and filters. CNG seeds have been known to enter deep into radiators and gradually work their way out via vibrations years later.

**The following photo's detail those areas most commonly contaminated:**



Figure 14. Radiator

CNG seed can penetrate **radiators**, becoming dislodged through vibration.



**Filter screens** can minimise dust and weed seed entering the **engine** and **radiator**.

**Figure 15. Filter screen**



**Air filters** help prevent contaminants entering the engine.

**Figure 16. Filter**



**Interior mats and upholstery** can become embedded with seed, often proving difficult to remove.

**Figure 17. Vehicle interior**



Figure 18. Blades

**Blades** continuously become contaminated due to the nature of works undertaken by such machinery (eg. roadside construction).



Figure 19. Buckets and hydraulic arms

**Hydraulic arms and hoses** around **buckets** can be points where contaminants build up.

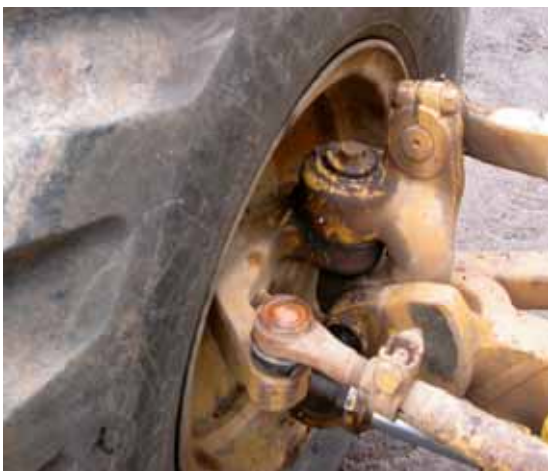


Figure 20. Wheel

**Wheels, tyres, rims** and **axles** are all points that come into close contact with contaminants. Regular cleaning allows the operator to identify damaged parts.





**Hydraulic stabilisers** commonly become heavily soiled.

Figure 21. Hydraulic stabiliser



During roadside construction and maintenance, machinery **tracks**, including **shoes** and **chains** become covered in mud.

Figure 22. Tracks



Mud and plant debris can be flicked up on vehicle **rooftops**, especially during inclement weather and peak flowering periods. This factor is increased when travelling at high speeds or in windy conditions.

Figure 23. Tractor Cabin



Figure 24. Steps

During wet weather and peak flowering periods, mud and plant debris can become attached to the vehicle **steps**.



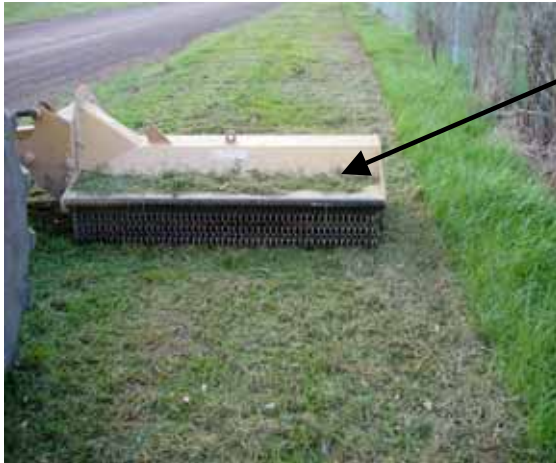
Figure 25. Chains

**Chains** often become entangled in grass debris and mud.



Figure 26. Attachments

**Fasteners** such as **nuts** and **bolts**, as well as edges of machinery can often become encrusted with mud and plant material.



Grass and other debris often build up on top of **slashers**, particularly around joints and in crevices.

Figure 27. Attachments



**Blades** and **tines on slashers and other implements** normally accumulate grass and mud during normal operation.

Figure 28. Mower attachment (underneath)



**Buckets** often become encased in mud due to the nature of work they are used for. **Bolts, tips/ teeth, blades** and **plates** found on buckets can act as catch points for weed seed and mud.

Figure 29. Bucket



**Joints** or **any cavity** on the body can often be contaminated with dust, grime, seed and plant debris

Figure 30. Rear of tractor



**Tynes**, **rippers** and **blades** often become covered in soil, which may contain weed seeds.

Figure 31. Tynes



Gravel and mud can build up on **ledges**, **trays** and **covers**. These areas often prove difficult to clean as contaminants often become baked on with heat created by the machinery.

Figure 32. Ledges



**Chassis** or **undercarriage** of machinery, often become heavily contaminated with mud, gravel and plant material. CNG panicle seeds can penetrate into surface gaps during operation.

**Turning plate/ wheels** need regular cleaning to ensure smooth operation.

Figure 33. Undercarriage



Oily areas ie. **hydraulic pumps** and **arms** especially around **grease nipples** often accumulate dust and weed seeds.

Figure 34. Hydraulics

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## 19. ACKNOWLEDGEMENTS

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## **APPENDIX 1.**

### **MACHINERY HYGIENE CONTRACT FEASIBILITY REPORT**

#### **FORWARD**

A Weed of National Significance Chilean needle-grass (*Nassella neesiana*) has an extraordinary ability to invade valuable agricultural and natural areas.

It is widely acknowledged that the movement of contaminated machinery into clean areas assists the spread of Chilean needle grass (CNG). It is not uncommon when inspecting machinery that has been used in areas, infested with CNG, that seeds can be found in many key areas including around wheel arches and radiators.

To address this form of seed dispersal land managers, should note that when hiring contractors to undertake work, they have the right to stipulate standards that they want adhered to. If machinery hygiene clauses are incorporated into these contracts, this is then legally binding. These types of documents help to maintain standards, protect land values and save money in the long-term as new infestations can be prevented. Without land managers taking such action, it is highly probable that CNG will continue to spread unabated.

#### **Slowing the spread of CNG and other weed species**

To minimise the spread of CNG via contaminated machinery, some Local Governments have nominated sites where contractors are required to clean down their vehicles. As seed is deposited at these clean-down points, localised regeneration of CNG would be expected and this would require remedial treatments by the land managers.

#### **What do contractors think?**

Many contractors agreed that they would sign a contract that required them to maintain a certain standard of vehicle hygiene. Some contractors already utilise commercial wash-bays to wash-down smaller machinery, whilst others utilise local government wash-bays for larger machinery such as Front End Loaders and Grass-slashers.

Those contractors without access to such facilities have expressed their concerns about how they will achieve this. Very few local government depots have wash-bay facilities and many commercial enterprises prohibit larger vehicles utilising their facilities to minimise damage to their establishments. However, truck-wash facilities do exist, as well as companies that have portable wash-bays. There is a need for the development of a set of standards for machinery hygiene in the field. Thus, contractors have

expressed an interest in the practical machinery hygiene package being developed by DPI.

Many contractors also said they would be keen to have a standardised clause in a contract that would address machinery hygiene. It is anticipated that such a contract clause would assist in regulating the industry, whilst also addressing the spread of pest plants.

### **Who will ensure compliance with the contract?**

Many organisations have stated that they do not have the time or resources to ensure compliance with such contracts. Apparently, some randomly visit contractors undertaking works, in order to carry out inspection to confirm tasks have been undertaken as agreed upon and to ensure occupational health and safety measures are implemented. It may be possible to inspect machinery hygiene at this stage. Advanced notice of intended inspections also occurs. It is not known whether surprise inspections would be more effective in monitoring compliance.

### **Costs incurred to implement hygiene protocols within contracts?**

A number of land managers have expressed concern that by requiring their contractors to sign a machinery hygiene clause, it may result in the contractors increasing their prices. If this was to happen, it could be argued that such a contract would improve machinery hygiene and therefore create savings in weed control costs as new infestations could be minimised.

### **Possible points to include in a machinery hygiene contract:**

1. Machinery is clean before entering a designated site ie. CNG-free area.
2. Machinery to be cleaned down at nominated locations before leaving to work at other locations ie. after working in an area where CNG is located. Note: that some councils stipulate within contracts the location of clean-down sites with the aid of maps, including global positioning systems (GPS), whereas others conduct site visits with contractors before the commencement of works (usually at the beginning of the contract).
3. Machinery will adhere to formed tracks where practicable and necessary ie. machinery such as 4WD vehicles used for chemical application.
4. Machinery used for slashing grass to start in areas that are not affected by CNG, before cutting sites where the presence of CNG increases. Thus, working in the good sites first and the worst sites last. This practice would help to minimise the number of times contractors are required to clean down vehicles, thus making the implementation of such a contract more feasible.



5. The desired clean down standard is stated within contracts eg. machinery be washed or brushed down.
6. That all contaminated material obtained through clean down procedures is collected and disposed of accordingly eg. bagged and left at a nominated location. This provides proof that clean down procedures have been undertaken. The containment of contaminated material helps to prevent further infestations.
7. Contracts could nominate the locations of clean-down points, which could be assisted by the use of GPS mapping. At present a number of land managers utilise maps to indicate CNG free zone, as well as severe infestations. This technology assists land managers and contractors to agree upon nominated clean-down locations.
8. Contractors are aware of the penalties stipulated within contract for machinery hygiene breaches.

## **RECOMMENDATIONS**

1. Encourage land managers to implement a standardised machinery hygiene contract for contractors in order to achieve consistency within the industry.
2. Land managers carry out random inspections of machinery in conjunction with existing inspections for occupational, health and safety and job completion purposes. This will assist in obtaining a more accurate representation of the standards of machinery hygiene being implemented by contractors.
3. Contracts put forward by land managers should be realistic and practical in order to achieve the desired outcomes.
4. When contract breaches are uncovered, depending on the severity, contractors should be notified. In profound or repeated cases of contract breaches, contractors should be notified that their actions have resulted in their contracts becoming terminated.
5. When advertising tenders, contractors should be made aware that machinery hygiene is considered of high importance, thus they are required to demonstrate how they will achieve this. It is common place when putting in tenders that, contractors must stipulate how they will maintain a high standard of occupational health and safety. Thus, if a similar requirement was implemented for machinery hygiene the spread of CNG could be minimised.

