PIRSA

Eastern Plains Boxthorn Control Trial and Demonstration



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This project was jointly funded through the Australian Government's Agricultural Competitiveness White Paper, Natural Resources Northern and Yorke region and landholder contributions.

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Background

Employed by Biosecurity SA and funded through the Australian Government's Agricultural Competitiveness White Paper, PIRSA's established weeds facilitator has been working with staff employed by the Northern and Yorke Landscape Board to plan and implement a landscape-scale community-led wheel cactus (Cactus) and African Boxthorn (Boxthorn) control project.

The aim of the project is to address and mitigate impacts through a coordinated, strategic and landscape scale approach by;

- Containing spread of Cactus and Boxthorn across infected properties to prevent the spread further into adjacent properties.
- Providing affected landholders with technical advice to assist with the treatment and maintenance of areas infected with Cactus and Boxthorn.
- Developing a strategic approach with landholder groups for control programs to more efficiently reduce the impact across the landscape.

Aerial Boxthorn control has been conducted successfully in the Coorong as well as the Yorke and Eyre Peninsulas for many years. Although the herbicide tebuthiuron has been applied and monitored for effectiveness and off-target impacts in these coastal sandy environments, limited information is available about its use in the heavier soils of the South Australian Rangelands.

The aerial Boxthorn control trial is one component of the broader Eastern Plains Cactus and Boxthorn Management Project with intentions to;

- Demonstrate a variety of best practice control options available for Boxthorn control.
- Build the capacity of the community to effectively select the appropriate control tool/s for Boxthorn control on their property.
- Demonstrate effectiveness of the herbicide tebuthiuron in controlling Boxthorn in the South Australian rangelands.
- Demonstrate the efficiencies that can be gained by being involved in a coordinated aerial control program.
- Encourage landholder investment into Boxthorn control.

The trial was conducted between 3 - 11 November 2019 with a total of 21 flight hours spread across five days of operations. High winds on the second day resulted in the program being delayed as the gusty conditions posed a risk to both the safety of the operator/s and the accuracy of herbicide application.

Project Area

The Eastern Plans Boxthorn control trial was conducted over 11 private properties extending from Terowie to Orroroo (Figure 1).

The project area included areas of the Upper North-Southern Flinders, Murraylands Rangelands and North East Pastoral Districts containing areas of private lands, Crown Lands and roadsides that are highly infested with Opuntioid Cacti and Boxthorn. These introduced plants are identified as Weeds of National Significance (WoNS) and are declared under the *Landscape South Australia Act 2019* due to their invasiveness and environmental and economic impacts.



Figure 1: Eastern Plains Cactus and Boxthorn Control Project Area

Methodology

Given uncertainties regarding the expected efficacy of tebuthiuron in rangeland environments, the aerial boxthorn control trial was limited to 11 private landholders from the area between Terowie and Orroroo (Figure 2).

Landholder participation in the trial was based on:

- Presence of Boxthorn in areas suitable for aerial application.
- Previous involvement in Boxthorn control activities.
- Willingness to contribute to the program and conduct follow-up control activities.
- Spatial distribution within the project area.
- Future opportunities to engage neighbouring properties in control activities.

In addition to the 11 properties involved with the aerial trial, one property at Franklyn was selected as a demonstration site. Two 16ha plots were marked out at the Franklyn property using Avenza maps and star droppers, with one plot receiving control using tebuthiuron and the other mechanical Boxthorn removal. The site was selected based on its uniform distribution of high density mature Boxthorn and the willingness of the landholder to host a workshop and support ongoing research.

11 Boxthorn treatments and 6 Cactus treatments were applied to demonstrate a variety of best practice control methods available. A combination of liquid and granular formulations were applied using foliar spray, cut stump, basal bark, soil application and stem injection techniques.

Planning

Extensive planning was undertaken by Primary Industries and Regions (PIRSA) and Northern and Yorke Landscape Board staff to develop relevant documentation such as standard operating procedures, job safety analysis and environmental risk assessment (Appendices 2 and 3).

Parcel details were sought from landholders and maps showing parcel boundaries and aerial imagery were prepared to assist with property visits. Property visits were conducted to determine the density and distribution of Boxthorn infestations in each paddock, in addition to control priorities in consultation with the landholder. Particular attention was also paid to the mapping of hazards such as power lines and exclusion zones such as lambing paddocks, water points and/or drainage lines.

Maps were updated in Arc GIS showing the parcels identified by the landholders and numbered in order of priority for control. Low, medium and high density classes were used as part of the mapping process for the aerial Boxthorn control trial. These classes were derived by visual assessment using the methodology outlined in the Field Manual for Surveying Nationally Significant Weeds (McNaught *et al*, 2008). As an aid, visual estimates of <1 plant per ha, between 1 and 10 plants per ha and > 10 plants per ha were used to assign low medium and high density respectively.

Landholder agreements were developed with each of the trial participants, outlining the limitations, unknown variables and details of the landholder contribution as well as a requirement for landholders to conduct follow-up surveillance and control as required over a ten year period (Appendix 1).

Mapping and Data Collection

Georeferenced PDF maps were produced for each property to enable real time tracking of location and data loggers were sourced from Ian Dunk (South Australian Arid Lands Landscape region) set up to enable mapping of each Boxthorn treated (as well as other opportunistic records of Cactus). Three buttons were set-up on the data logger to enable recording of 1) Boxthorn controlled 2) Boxthorn not controlled 3) Cactus.

When preparing maps for aerial operations, it is important to ensure there is a common standard for display to avoid any confusion when interpreting maps during operation. It was decided to use the same mapping standards as that used for aerial vertebrate pest control operations. The standards for map preparation are as follows:

- Approved operating area: transparent green (60%, RGB 188-247-191)
- Unapproved operating areas: transparent red (60% RGB 255-0-0)
- Specific no-go/No-fly areas: solid red (0% RGB 255-0-0)
- Available power line data (differentiate between High Voltage and SWER)
- A list of approved species in text box
- Named roads where applicable (standard road symbology)
- Each property map to contain time allocated for treatment
- Participating landholdings to be numbered, with a corresponding overview map (showing the entire operating area), table of names, contact details and run time allocations available to the ground crew.
- Two versions for settled areas, the first having a 50K topo background (for features such as roads, buildings etc.) the second having an image background (for veg identification)
- Pastoral areas to display water sources, water courses and contours if in the ranges.
- The page size in which the PDF is produced needs to be large enough for effective zooming to see detail on the tablet (A2 is required in the pastoral zone).

Following each run, data from the data loggers was downloaded as both CSV and shape file using Ozi Explorer.

Upon completion of the trial, maps were produced showing each Boxthorn treated and sent to landholders to assist with follow-up control. Landholders were trained in the use of Avenza Maps, enabling landholders to revisit the location of treated Boxthorn for the purpose of monitoring and follow-up control.

INDEX MAP



Figure 2: Index map showing the operating area and reference to individual property maps.

Funding

A partnership approach between landholders, the Northern & Yorke NRM Board and PIRSA was taken to maximise the benefits of the trial. At a total cost of \$31,000, the trial featured a healthy 48% return on investment with a total of \$10,000 worth of landholder contributions.

A condition of involvement with the program was a requirement for landholders to make a minimum financial contribution of \$400 towards purchasing herbicide and helicopter time. There was also an option for landholders to contribute additional funds to go toward further control with six of the eleven landholders choosing to contribute between \$1000 and \$2000 each. Total helicopter time remaining after subtracting expenses for food, accommodation, ferry and herbicide was assigned to each landholder based on their proportionate contribution.

It is important to note that the costings provided within this report do not include the food, accommodation and ferry as these costs will vary significantly depending on size and location of the program. Inclusion of these cost is will result in an increase in the cost per plant and per hectare.

Aerial Control

An experienced helicopter company (Helifarm) was engaged to work alongside N&Y NRM Board and PIRSA staff. The most effective helicopter to use for this type of work is the Robinson R44 due to its maneuverability, minimal downdraft and ability for the pilot and "applicator" to be seated on the same side to enable target presentation. The responsiveness and maneuverability of the R44 enables safer operation close to the ground when compared to jet turbine helicopters. The minimal downdraft enables accurate hand-delivered application of the granular herbicide from the air and minimises the risk of off-target damage.

Advice received from those having conducted extensive aerial Boxthorn control suggested that to enable an accurate and efficient application, medium to large Boxthorn should receive a rate of approximately 40g per plant. Although this rate is above the label recommendation for ground treatment it falls well within the maximum aerial application rate of 15kg/ha.



Figure 3: Aerial application of tebuthiuron (left) and distribution of herbicide (right)

A minimum of three people were required to conduct the aerial control program. Helifarm supplied both a pilot and a ground crew member supporting logistics such as re-supply of fuel and herbicide, and also conducting herbicide application as required to avoid fatigue of the third agency staff member. Each run conducted was a maximum of three hours at which point a re-supply of both fuel and herbicide was required.

Herbicide was stored in multiple 90mm poly tubes with a threaded lid and secured behind the front passenger seat of the helicopter. The helicopter was fitted with a side step to enable the passenger to safely sit sideways (behind the pilot) and apply the herbicide without twisting in an unsafe manner. The door was removed from the helicopter during operation and the passenger was fitted with a harness and secured to the helicopter to prevent possible falls.

One hand was used to apply the herbicide and the other was used to log individual plants treated. Nitrile gloves, eye protection and a disposable P2 dust mask were worn to ensure safety of the operator.

Two data loggers were used during the operation to enable download of data from each logger in between runs and ensure no data was lost.



Figure 4: Preparing for flight (left) and control operations underway (right).

Mechanical Control

An experienced contractor was engaged to undertake the mechanical control at the trial site. The control was undertaken though the use of a front end loader with a customised tine attached to the bucket (Figure 5), enabling a forward and upward motion to minimize the likelihood of roots breaking off and subsequent re-growth.

Various machines and "plucker" attachments are available for Boxthorn removal however irrespective of the implement used, there are benefits from conducting mechanical removal when the soil is moist. Moist soil is likely to reduce the amount of roots which break under pressure and therefore the amount of re-growth and subsequent follow-up control required.

Following mechanical control an assessment of the proportion of regrowth was undertaken by randomly selecting 50 plants throughout the control plot and recording the presence or absence of regrowth. The number of plant locations exhibiting presence or absence of regrowth was then divided by the 50 to ascertain the proportion of plants showing regrowth.



Figure 5: Front end loader with "customized Boxthorn removal attachment".

Demonstration Site

A key component of the trial was to establish a demonstration site to support decision making processes around best practice Boxthorn control.

In addition to the two 16ha aerial and mechanical demonstration plots, eleven Boxthorn and six Cactus control treatments were applied using various herbicides and application methods (Figure 7).

Each treatment was applied to three plants with flagging tape used to mark each plant and a permanent photo point established using a wooden surveyor's peg. Avenza maps was used to map the location of each treatment (Figure 7) and photo points were taken before treatment and at three month and six month intervals. Treatments applied were selected based on those that are frequently used by landholders in addition to other on label recommendations for Boxthorn control identified in the SA Weed Control Handbook, 2019.



Figure 6: Application of soil applied, cut stump and foliar spray herbicide treatments (left to right)

DEMONSTRATION SITE



Figure 7: Demonstration site overview.

Photo Points

One photo point was established for each of the 11 treatments applied to monitor the effectiveness over time. A clump of three plants were selected and the photo point situated in a location showing each of the three plants receiving a treatment. Photo points were established by recording the GPS coordinates and treatment details such as herbicide, application rate and application method in Avenza Maps (a free online mapping tool). Each plant treated was marked with flagging tape and the photo point location permanently marked with a wooden survey peg. The treatment/photo point number and direction the photo was taken was recorded on each survey peg in permanent marker.

Photo points were established at each of the 11 Boxthorn control treatments to monitor effectiveness over time (Figure 8). Photo points were also established within the 16 ha plots of both aerial and mechanical control in addition to two further photo points to assess the impact of tebuthiuron on native species.



Figure 8: Photo point of boxthorn before (left) and after (right) treatment with Gladiator and Ally.



Figure 9: Mechanical boxthorn control, before (left) and after treatment (right).

Results

Aerial Treatment

Indicative results from the aerial control trial showed promise with treated plants looking browned off with approximately 5%-10% of each plant "re-shooting" four months following treatment. Given the mode of action of tebuthiuron (photosynthesis inhibitor), it is expected that plants will exhibit multiple attempts at re-shooting before dying which in some cases may be between 12 months to two years (McNaught *et al*, 2008).

Overall, the number of plants missed appeared to be low (i.e. less than 5%) however expectations were made clear with landholders that there are likely to be a proportion of small plants and/or a small number of plants in medium to high density infestations that are missed. The expectation that some plants will be missed highlights the importance of follow-up control, not only to re-treat any that may not have died from the initial treatment but also for primary control of those missed. Landholders have been requested to maintain annual records of follow-up control in addition to mapping further primary control works undertaken through the use of Avenza Maps. Landscape SA staff are to seek annual updates from landholders to quantify surveillance and control efforts taking place.



Figure 10: Aerial control before (left) and after (right) treatment.



Figure 11: Landscape scale aerial Boxthorn control.



Figure 12: Regrowth	four months	following aerial	tebuthiuron	application.
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Average Aerial Control Costs- 3215 ha of mixed low medium and high density							
Plants Controlled	Average Cost Per Plant	Average Cost Per ha					
5260	\$3.99	\$6.96					
Aerial Control Costs- 491 ha of low density							
Plants Controlled	Cost Per Plant	Cost Per ha					
105	\$13.08	\$2.65					
Aerial Control Costs- 59 ha of medium density							
Aerial Control Costs- 59 ha	of medium density						
Aerial Control Costs- 59 ha Plants Controlled	of medium density Cost Per Plant	Cost Per ha					
Aerial Control Costs- 59 ha Plants Controlled 423	of medium density Cost Per Plant \$3.77	Cost Per ha \$22.08					
Aerial Control Costs- 59 ha Plants Controlled 423 Aerial Control Costs- 98 ha	of medium density Cost Per Plant \$3.77 of high density	Cost Per ha \$22.08					
Aerial Control Costs- 59 ha Plants Controlled 423 Aerial Control Costs- 98 ha Plants Controlled	of medium density Cost Per Plant \$3.77 of high density Cost Per Plant	Cost Per ha \$22.08 Cost Per ha					

 Table 1: Aerial control cost (excl. ferry, food and accommodation).

Mechanical Treatment

A total of 1260 Boxthorn were removed from the 16ha plot on 11 October 2019 (Figure 13). The dense nature of the Boxthorn resulted in minimal ferry time between plants. Multiple piles were created to reduce the distance plants were dragged and therefore reduce the potential spread of seed. A total of 11 hours of loader time plus three hours of ferry time were required to conduct the mechanical control component of the trial.

A follow up visit in March 2020 showed less than 5% of plants exhibiting re-growth however expectations were that subsequent rainfall events and sufficient time would likely result in a greater proportion of plants showing signs of regrowth. A repeat of the monitoring conducted on 3 July 2020 showed that 28% of plants removed mechanically showed signs of regrowth from broken root fragments.

Infestation size and density has a significant impact on selection of the appropriate control method. For mechanical control, the higher the density the more cost effective due to a reduction in the ferry between plants. Lower density infestations over large areas will result in significant increases in both the cost per plant and the cost per ha.

Mechanical Control Costs- 16 ha of high density						
Plants Controlled	Cost Per Plant	Cost Per ha				
1260	\$1.71	\$135.05				

Table 2: Mechanical control cost (excl. ferry).



Figure 13: Mechanical Boxthorn removal plot.



Figure 14: Disturbance following mechanical Boxthorn control and subsequent regrowth.

Off Target Impacts

Observations were made during post treatment monitoring of a number native species appearing to have a degree of tolerance to tebuthiuron at the rate applied (approximately 6.5g m²). Three different species (*Hakea leucoptera, Alectyron oleifolius ssp. canescens and Acacia victorii*) appeared to show no signs of herbicide impact even though herbicide was applied well within the root-zone and the target Boxthorns appeared to be significantly affected (Figures 15-17). Although at the time of monitoring there appeared to be no impact on these native species, further monitoring (18 months following initial treatment) will be required to make a sound judgement regarding the impact on these species. It is possible that given limited rainfall following application, the herbicide had not yet reached the root-zone of the deeper rooted native species.



Figure 15: *Hakea leucoptera* showing no sign of dieback 7 months after application of tebuthiuron.



Figure 16: *Alectyron oleifolius ssp. Canescens* showing no sign of dieback 7 months after application of tebuthiuron.



Figure 17: *Acacia victorii* showing no signs of herbicide impact 7 months after application of tebuthiuron.

Recommendations

Given significant momentum has been built within the community as part of the first aerial Boxthorn trial, it would be beneficial to capitalise on this momentum in the 2020-2021 financial year.

Recommendations arising out of the 2019 aerial Boxthorn trial include:

- Continue monitoring the results of the aerial, mechanical and demonstration treatments for two years at quarterly intervals.
- Seek additional funds and/or assist landholders in the preparation of grant opportunities to support follow-up control.
- Conduct further aerial Boxthorn control trials (using tebuthiuron and non-residual herbicide) on steeper slopes to assess likelihood of movement, effectiveness in shallow soils and feasibility of aerial spraying.
- If planning for a 2020-2021 aerial boxthorn control program, encourage involvement of landholders who participated in 2019. Debrief discussions suggested a willingness of many to participate again even if no subsidy were available.
- Gauge the level of interest in aerial control on properties neighboring 2019 Boxthorn control properties to increase the landscape scale approach and support future funding applications.
- Northern and Yorke Landscape staff are encouraged to seek an off label permit for aerial application of tebuthiuron at the per ha rate outlined for other states on the product label.

Considerations When Planning Aerial Control Programs

There are a number of key learnings from implementation of the Boxthorn control trial which may be used to inform planning future aerial and on-ground control programs. It is important to note that there are many uncertainties and variables which will impact on both the cost effectiveness and efficiency of a program.

A list of considerations are detailed below:

- It is important to select an experienced pilot/operator as their primary role other than safety is to identify Boxthorn plants and present them to the "applicator" whilst tracking which plants have been treated. An inexperienced operator is likely to result in a greater proportion of plants being missed.
- Aerial application can be incredibly turbulent at times so it is important to select a team of people who are comfortable flying at low altitudes and not prone to air sickness.
- Costs including ferry, food and accommodation are significant (Approximately \$7500 for this trial) and have not been included in the costings provided within this report.
- Flexibility around the timing of control activities has the potential to reduce the cost of ferry for both aerial and mechanical control if works can be coupled with other activities in the region.
- It is important to build in flexibility to allow for down time as a result of wind and/or rain as these
 will impact on both accurate application of herbicide and operator safety.
- The amount of herbicide required for a program will vary significantly depending on density, however it is recommended to allow 10kg of herbicide per hour of operation (based on an average of 40g/plant and 250 plants per hour of operation, assuming a mix of low medium and high density infestation).
- Thorough planning and on property hazard mapping is required to reduce the time ferrying between properties and undertaking individual property flyovers prior to treatment.
- Preparation of accurate geo-referenced PDF maps with clearly identified operational areas and flight allocations is important to ensure a smooth operation.

References

Government of South Australia, (2016). African Boxthorn (Lycium ferocissimum) FACT SHEET [online] Available at: <u>https://landscape.sa.gov.au/ep/plants-and-animals/pest-plants-and-animals/pest-plants</u> [Accessed 12 April 2020].

McNaught, I., Thackway, R., Brown, L. and Parsons, M. (2008). *A field manual for surveying and mapping nationally significant weeds.* 2nd Edition. Bureau of Rural Sciences, Canberra.

Additional information such as the Regain product guide, safety data sheet and label are available at:

Granular Products (ND), *Regain Pasture Regain Profit*. Available at: <u>https://www.granularproducts.com/products/gp-regain-200/</u> (Accessed 11 November 2019).

Appendices

Appendix 1: Land Mangement Agreement



LAND MANAGEMENT AGREEMENT

An Agreement between the Northern & Yorke Natural Resources Management Board and land owners for the cooperative improvement of biodiversity.

Aerial control of African Boxthorn in Southern Flinders and Lower Mid North Districts.

The 'Land Manager': (landowner or land manager	with landowners consent)	Date:		
Property name:	-9995999-024-1940-02214-035-029910-02219-02	e.:		
Property address:	00	8		
Phone (applicant):	Fax:			
E-mail:	-85	- K.		
Postal address: :				
ABN: (if applicable) n/a	GST registered? Y/N			
The 'Funding Provider	' (representative):	8		
The Funding Fromaci				
Organisation: Natural R	esources Northern & York	e		
Organisation: Natural R Phone: (08) 8658 1086	esources Northern & York Mob:	e Fax: n/a		
Organisation: Natural R Phone: (08) 8658 1086 Postal Address: 17 Seco	esources Northern & York Mob: nd Street, Orroroo, SA, 54	Fax: n/a		

Signed by or on behalf of	Signed by or on behalf of
Land Manager	Funding Provider
Date / /2019	 Date / /2019

Purpose

This agreement sets out the responsibilities of the Land Manager and the Funding Provider in relation to Aerial Control of Boxthorn in Southern Flinders and Lower Mid North Districts.

Background

African Boxthorn, Lycium ferocissimum is a Declared Weed and a Weed of National Significance (WoNS) that is widely spread across Southern Flinders and Lower Mid North Districts. It has one of the highest priorities for control because of significant risks to the environment and agriculture. Land Managers have a legal responsibility to control African Boxthorn on their land, under the Natural Resources Management Act 2004.

Traditional control methods for Boxthorn have not always been effective over a broad area and aerial application of granular Tebuthiuron herbicide enables a much greater area to be treated in a shorter period of time, resulting in significantly better value per hectare and per plant and reducing infestations to a long term manageable level.

The Aerial Boxthorn Control Trial is a collaborative effort across multiple property boundaries, PIRSA and Natural Resources Northern and Yorke (NRNY). This project is a trial to determine if granular Tebuthiuron herbicide is an effective control method for Boxthorn in the districts mentioned above.

Extensive and successful trials have been carried out in other parts of the state with the use of aerial Tebuthiuron application. As Tebuthiuron has not yet been tested in rangeland soils this trial aims to confirm the effectiveness of this herbicide in the region for the control of Boxthorn. Based on trials in other parts of the state, expectations are that Tebuthiuron will be successful in controlling Boxthorn.

This trial is a subsequent project derived from the overall arching *Eastern Plains Cactus and African Boxthorn Management Project*. The *Aerial Boxthorn Control Trial* will be conducted in accordance to the Department's Environmental Risk Assessment and Job Safety Analysis.

Funding

The 'Funding Provider' for this project is Northern & Yorke Natural Resource Management Board (NYNRMB). Additional funds to be provided by PIRSA through the Federal Governments Agricultural Competitiveness White Paper and by private Land Manger's contributions. NYNRMB will be represented during this program by employees of NRNY. All funded activities and support is provided to the Land Manager in good faith, with the intent to achieve the objectives of the project.

The funding is being used for the following activities:

- af mart the second the
 - Strategic aerial application of Tebuthiuron to treat Boxthorn on private properties.
 - o Technical advice and support during follow-up and monitoring.

Activities under this project are designed to initiate the recovery of the region's biodiversity assets. In the longer term it is expected that Land Managers in the region will undertake activities to maintain the condition of the biodiversity assets on their lands.

General Terms and Conditions

By signing this Land Management Agreement, the Land Manager, where works nominated in the terms of this Agreement are to be carried out:

- commits to the long term management of any works carried out on their lands (as specified in this management plan);
- commits to the long term management of declared and environmental weeds and feral animals on their lands.

If not the landowner, the Land Manager must have the landowner's authorised consent to enter into this agreement (NRNY may request documented proof of permission).

In the event of any disagreement between the Land Manager and the Funding Provider, mediation is the preferred form of dispute resolution.

In undertaking all works specified in the Site Agreement Schedule (see below), the Land Manager is required to adhere to the conditions outlined in the *Aboriginal Heritage Act 1988* in regards to the discovery and disturbance of Aboriginal heritage sites.

Important: Properties aerially treated with Tebuthiuron in this project will be dependent on a range of factors, including the location of infestations in relation to watercourses, sloping ground and native vegetation, property size, Boxthorn densities, vegetation type, aerial obstructions, time factors and budget. Not all sections/parcels on each property identified will be treated under this Agreement.

The Land Manager/s agrees to:

- Work with representatives or nominees of the Funding Provider to undertake the activities listed in the Site Agreement Schedule.
- 2 If requested, make available to NYNRMB evidence that the assistance provided has been used as stated in the Site Assessment Schedule.
- 3 Allow representatives or nominees of the Funding Provider to access the property for inspection purposes at agreed times and with adequate notification.
- 4 All works undertaken by the Land Manager are undertaken at the Land Manager's own risk. NYNRMB or its nominated representative/s will not be



responsible for any loss of life, damage to property or increased management costs that may result from the Land Manager's own works.

- 5 Ensure a safe operating environment is provided at the Land Manager's site for all workers associated with this program.
- 6 Undertake works specified in the Site Agreement Schedule in a safe and timely manner.
- 7 If requested, provide written evidence of compliance with the terms and conditions of this Agreement to NYNRMB.
- 8 In the event that the property is sold or leased the Land Manager/s will ensure that the new Land Manager or lessee is aware of the Agreement. The Land Manager will advise NYNRMB or its nominated representative/s of the sale or lease so that there is every opportunity to continue to implement and maintain the works.
- 9 If the Land Manager occupies the land as a lessee the Land Manager must be authorised by the owner of the land to undertake the works program and will provide a copy of the agreement to the owner.
- 10 It is understood that all on-going follow-up control is the responsibility of the Land Manager/s and must continue for at least a period of ten years, for example:
 - pest plants and animals are controlled
- 11 Protect natural regeneration of indigenous plant species within the project area from negative impacts.
- 12 Due to the nature of the herbicide being used (*Tebuthiuron*) results will only occur following rainfall and active growth.
- 13 In the event of extreme rainfall, there is potential for the herbicide to move and/or become less effective on target species, Boxthorn.
- 14 Land Mangers will be invoiced direct by Helifarm and agree to pay their contribution in a timely manner.
- 15 As agreed with project staff- Land Manger/s will contribute an amount of \$..... paid directly to Helifarm.
- 16 Allow representatives or nominees of the Funding Provider to access trial site for follow-up monitoring.
- 17 All the section/parcels provided on the attached map are true and correct and authorises works to be carried out on the agreed locations.
- 18 Restricting access to the helicopter operational area. Due to safety requirements, only the Landowner or Land Manger/s may be present in the area of operation.
- 19 Allowing helicopter operation to be carried out on their property between the 4-6th November 2019.

The Funding Provider agrees to:

- Arrange for, or undertake, any works allocated to the Funding Provider in the Site Agreement Schedule in a safe and timely manner, time and weather permitting.
- 2 Ensure contracted providers engaged for works specified in the Site Agreement Schedule are reputable.



- 3 Consult with the Land Manager on any proposed amendments to the Site Agreement Schedule.
- 4 Provide technical advice and assistance to facilitate the works in the Site Agreement Schedule, to the Land Manager on request.
- 5 Provide payment for works detailed in the Site Agreement Schedule subject to a satisfactory site inspection by a representative or nominee of the Funding Provider.
- 6 Ensure reasonable notice is given to the Land Manager/s prior to contractor activity or site attendance by a representative or nominee of Funding Provider for purposes associated with this program.
- 7 Ensure personal information obtained remains confidential.
- 8 Ensure that all works undertaken through the project comply with relevant legislation.

SITE AGREEMENT SCHEDULE

Property Name:								
Section(s)/Hundred(s) where works will be undertaken:								
Brief description of site	e(s) where works will be	undertaken	:					
Site	Specific Activities/Funding Provided	To be Completed by (dd/mm/yy)	Works undertaken by **(PR- SC-L)	Expected Outcomes				
Aerial Boxthorn Control	Aerial Boxthom Control- areas treated will be based on time and funding available and weather permitting. Note – not all sections/parcels on each properties will be treated under this project.	November 2019	PR	 Reduced Boxthorn numbers on property. Ongoing follow up reduced to more manageable levels. Improved biodiversity value of property. 				
Follow up African Boxthorn control	Any form of African Boxthorn control methods to be used	From 2019 - Ongoing	L	- Declared Weed species removed from landscape.				
	Total funding provided to	Applicant - O	n ground Wo	rks only				

* * Works to be performed by: (PR) – Program Representative or Nominee – (SC) Sub-contractor – (L) Landholder

Other information

Monitoring the results of the activities

Monitoring undertaken by Funding Provider may include re-visiting areas of aerial control to conduct a rapid style assessment of the treated area for condition of Boxthorns and effectiveness of aerial boxthorn control.

Communication and extension

All photos, maps, and information collected during the project remain the property of NYNRMB, who reserve the right to use the information in any format that they see fit to communicate or promote the activities and outcomes of the project. Copies of information collected on the property will be provided to the Land Manager.

Participation in the project may result in Land Managers being asked to contribute to communications regarding the progress and outcomes of the project such as quotes, photographs, case studies and workshops.

Land Managers may be asked to consent to the placing of signage on the property boundary regarding their participation in the project.

Maintenance activities

Participation in the project is under the condition that the Land Manager consents to work with Funding Provider to honour this Land Management Agreement. The focus of this simple Agreement is on protecting and maintaining the outcomes of the project activities via management of issues at the property scale such as weed control (e.g. reinfestation and reestablishment of African Boxthorn).

Boxthorn treated with Tebuthiuron will not require follow up for 18 months, due to the nature of the chemical. Tebuthiuron inhibits photosynthesis, resulting in the plant making several attempts to re-sprout new growth before 100% fatality usually after 18 months. After the initial 18 months post- treatment, treated Boxthorn will need to be monitored/maintained and followed-up for at least 10 years by the Land Manager.

Appendix 2: Geo-referenced PDF's





Appendix 3: Job Safety Analysis

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Job Safety Analysis Worksheet



JOB SAFETY ANALYSIS WORKSHEET Activity/Task Name: Aerial Boxthorn Control

Context Aerial boxthorn control methods are being utilised by DEW as an effective strategy to control boxthorn in rangeland areas. An experienced helicopter company is contracted to provide equipment (i.e. helicopter), pilot and ground crew to work alongside DEW staff to administer granular herbicide to individual boxthorn plants whilst flying at a low level over treatment areas.

African Boxthorn, Lycium ferocissimum, is a Declared Weed and a Weed of National Significance (WoNS) that is widely spread across the Southern Flinders. Upper North and Rangeland districts. It has one of the highest priorities for control because of significant risks to the environment and agriculture. Heavy infestations and limited access to effected areas has meant that traditional control methods have not been able to match the regrowth and spread potential of the weed. Utilising this aerial application method of granular herbicide enables a much greater area to be treated in a shorter period of time, resulting in significantly better value per hectare and per plant.

The most effective helicopter to use for this method is the Robinson R44 due to its immediate responsiveness and minimal downdraft. The immediate responsiveness enables working very low to the ground with high manoeuvrability, compared to the lag-effect found in jet turbine helicopters. The minimal downdraft enables accurate hand-delivered application of the granular form of Tebuthiuron chemical from the air and minimises off-target damage, compared to the much higher downdraft caused by a jet turbine engine with more power.

New Revised X	Version	00.02 Date Complet		eted: 26/06/2019	Next Review Date: 26/0	06/2020	
Assessment team: Paul	O'Leary, Troy Bo	wman, Denni Russe	ell and Aliso	n Nicolson	Supervisor/Manager: S	tella Kondyl	las
Group: Parks and Regio	ons Region/	Branch: Northern &	2 Yorke	Unit:	Location: Mid North an	d Southern	Flinders
Steps required to complete the activity	Hazards Identified	Risks Identified	Risk Level before Control	Risk Control Hierarchy o Eliminate/Substitute/Engineeri PP	Measures If Control ng/Isolation/Administrative/ E	Risk Level after Controls	Who is responsible?
Planning/Assessment Contacting key stakeholders Mapping LMA's	Desk work (e.g. using computers and telecommunica tions)	Personal injury – strains & sprains, repetitive movements, sustained posture	L (D2)	Practice Office Ergonomics		L (162)	Operator

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WHSBIM Program 3 - Hazard Management: Job Safety Analysis (/SA) Procedure

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Job Safety Analysis Worksheet

Loading vehicle	Manual handling - Lifting - Reaching - Bending - Push/Full - Repetitive movement	Personal injury – strains/spraios Slips, Trips, Falls	м (СЗ)	 Appropriate manual handling techniques as outlined in Manual Handling training (Administrative) Team lifting (Administrative) Provide clear access between storage location and vehicle Store equipment at appropriate heights Onsite assessment of risk and planning of approach 	L (E3)	Operator
	Handling chemicals	Chemical exposure	M (C2)	 Wear appropriate PPE – i.e. gloves (Engineering) Wash hands after task. Ensure hand washing facilities in pround vehicle 	L (£2)	Operator
Travel to and from helicopter staging location	Driving :	Vehicle Accident Other road users Road/Track Condition	M (D4)	 Select appropriate vehicle for task Driver has undergone 4WD training in last 5 years and has provided a formal record of the training Vehicle maintenance impection/checklist No driver shall operate any vehicle under the influence of any illegal drugs, substance or alcohol 	M (D4)	Operator
Working with Helicopters	***Induct	ion to be con	npleted	by Helicopter Pilot in Charge		
Approaching and working around helicopter	Maving Ratars	Decapitation	H (SD)	 Pre-flight induction/briefing by pilot Approach helicopter only under the instruction of the pilot Only approach from the front quadrant of the helicopter, giving the tail rotors and the rear three quadrants a wide benth. If an uneven slope, approach from downslope if possible. 	L (2D)	Pilot Operator
Loading equipment into helicopter - rotors off	Terrain	Personal injury – strains/sprains Slips, trips, falls	M (C3)	 Pre-fight induction/tariefing by pilot PPE (non-slip footwear, overalls) Spatial awareness 	L (E1)	Pilot Operator

WHSBUM Program 3 - Hazard Management: Job Sofety Analysis (ISA) Proceedure Page 3 of 13

Government of South Australia Department for Component and Water		ot	Work H b Safety	lealth & Safety Analysis Worksheet	il il	
	Manual handling - Lifting - Reaching - Bending - Push/Pull Repetitive movement	Personal injury – strains/sprains Slips, Trips, Falls	M (C3)	 Appropriate manual handling techniques as outlined in Manual Handling training (Administrative) Team lifting (Administrative) Provide clear access between storage location and vehicle Store equipment at appropriate heights Onsite assessment of risk and planning of approach 	L (E3)	Pilot Operator
Gearing up (helmet, Namess)	Hamess incorrectly fitted	Injury Fall Death	£ (CS)	 Pre-fight induction/briefing by pilot Ensure harness fitted correctly prior to boarding Ensure harness securely attached to safety point prior to take off 	L (E4)	Pilot Operator
Storing personal equipment	Loose items in cabin	Asset damage Crash Death	£ (CS)	 Pre-flight induction/briefing by pilot Ensure items stored safely prior to take off No unnecessary items in the cabin 	L (E4)	Pilot Operator
Communications check	No comms (internal or air/ground)	Crash Death Asset Damage	£ (C5)	 Pie-flight induction/briefling by pilot Check comms prior to take off Do not operate without functioning comms 	L (E4)	Pilot Operator
Embarking Helicopter	Terrain	Silps, trips, fails Abration	M (2C)	 Pre-flight induction/briefling by pilot PPE (non-slip footwear) Spatial awareness e.g. be aware of what is happening around you are the helicopter rotors on? Are there any objects on the ground that may be a tripping huzard? Where is the pilot or other passengers? etc. Embarking the helicopter only under the instruction of the pilot 	L (2D)	Pilot Operator
Starting helicopter	Environmental hazards • Wind • Rain • Terrain	Injury Crash Death Asset Damage	H (DS)	Assess weather conditions and forecast prior to start up procedure Spatial awareness Communications with ground crew Procurement process to ensure appropriate malifications and experience of plot	M (ES)	Filot Project Manager

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	Loose debris	Eye injury of bystanders Asset damage		 Constant awareness of blades throughout process. Eye protection (rafety glasses) and/or heimet for bystanders if remaining nearby during take-off and loose debris present onsite. Remove or secure loose debris where possible prior to start up. 		Pilot Operator Ground Crew
	Pilot distractions	Flipt error	M (C2)	Maintain ullence during start-up Pre-flight Induction/briefing by pilot Working around aircraft SOP	1.(62)	Pilot Operator
	Animals/people approaching unexpectedly	Injury Death	H (DS)	Communications with ground crew Spatial awareness Choose landing area with clear vision away from busy areas	M (E5)	Pilot Operator Ground Crew
	Mechanical / asset failure	Asset damage	M (C2)	 Procurement process to ensure appropriate maintenance, qualifications of operator, especienced staff on selection panel (not cheapest quote) Awareness, communications with the ground crew and operator. 	L (E2)	Pilot Ground Crew Operator
Loading equipment into helicopter - rotors on	Decapitation	H (DS)	 Pre-fight induction/briefing by pilot Spatial awareness Approach from downhill side as per 'working near helicopters' instructions Only approach from the front quadrant of the helicopter, giving the tail rotors and the rear three guadrants a wide berth. Wait until pilot confirms before approaching helicopter. 	M (ES)	Pilot Operator	
	Terrain	Slips, trips, falls Decapitation	M (C3)	 Pre-Right Induction/briefing by pilot PPE (non-slip footwear) Spatial awareness 	.L. (E3)	Pilot Operator
	Manual handling - Lifting	Personal injury – strains/sprains Slips, Trips, Falls	M (C3)	 Appropriate manual handling techniques as outlined in Manual Handling training (Administrative) Team lifting (Administrative) 	1. (E3)	Pilot Operator

WHS8LIM Program 3 - Hazard Management: Job Safety Analysis (JSA) Procedure Page 5 of 13



	- Bending - Push/Pull Repetitive movement			Provide clear access between storage location and vehicle Store equipment at appropriate heights Ornite assessment of risk and planning of approach
Take off (Note - heavy fuel loads) Obstructions • Trees • Power lines • Structures • Windmills	Injury Crash Death Asset Damage	E (SC)	Pre-flight induction/briefing by pilot MitES Pilot Maintain situational awareness Take instructions from pilot	
	Pilot error	Injury Crash Death Asset Damage	E (5C)	Pre-Eight induction/briefing by pilot Mittain situational awarenes Maintain situational awarenes Maintain situational awarenes Mittain situationa situationa situational awarenes Mittain situational situatio
Environmental conditions – Le terrain	Environmental conditions – Le. terrain	Injury Crash Death Asset Damage	E (SC)	Pre-fight induction/briefing by pilot Mi (E5) Pilot Maintain situational awareness Take instructions from pilot
	Weather - rain, glare, wind	Injury Crash Death Asset Damage	¥ (SC)	Pre-flight induction/briefing by pilot Check weather conditions prior to start up procedure. Take instructions from pilot
Traveling to/from treatment areas	Faster speed than during operations	Bruises Wind chill	M (C2)	Keep arms and legs inside cabin during transit
Flying over open water	No landing area nearby in case of emergency landing requirement	Drowning	E (SC)	Follow plot instructions PFE (Life jackets) Check harness is secure If planned ocean crossing, helicopter should be fitted with floats on the skids.

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tdentifying target areas/properties	Power lines and other structures / hazards Wrong groperty treated	Injury Crash Death Asset Damage Off-target damage	£ (SC)	 Use pre-prepared Geo-referenced maps loaded on iPad Ensure correct property is identified. Pre-flight decide which properties to be targeted in that shift Prior to commencing operations on each property, the entice perimeter must be flown to identify power lines, windmills or other potential hazards. Maintain communications with pilot 	M (ES)	Pilot Operator
Repositioning to commence treatment on site	Falling from helicopter Loose items Manual Handling – twisting, bending	Fall / death Crash Asset damage Personal Injury Strains & Sprains Musculoskeletal Injury	£ (5C)	 Check harness is secure Secure loose items Maintain communication with pilot Adequate space inside cabin must be allowed for best posture and movement 	M (ES)	Pilot and Operator
Dispensing granular chemical	Communicatio as loss	Accident	M (C2)	1. Maintain communications with pilot	L (E2)	Operator
	Off-target damage	Environmental damage	M (C3)	 Correctly identify target species Avoid terrain and vegetation type as per directions of use i.e. slope, trees, water, heavy soils (See risk assessment summary for further information). Procurement processes ensure appropriate type of helicopter (minimal identifia) See risk assessment summary for detailed environmental risks. 	L (E3)	Operator Project Manager
	Manual Hantling - Reaching - Bending - Push/Pull	Strains & Sprains Musculoskeletal Injury	M (C3)	 As the task is physically demanding, each person must not perform the same task for two concurrent shifts, and no more than two shifts in a row if changing from dispensing to navigating. Each shift maximum 3 hours. 	L (E3)	Operator

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Generation of the second secon	ef South Australia Environment	ot	Work b Safety	Health & Safety Analysis Worksheet	in the second se	
	- Sustained awkward posture - Repetitive movement			 Personal water, snacks and any medications (e.g., inhalers/insulin) to be carried in secure locations accessible to operator. New operators to be made aware of demanding nature of the task prior to boarding. Note: Lots of neck bending and twisting involved over prolonged time periods. Lots of reaching forward and sideways for prolonged time periods. Repetitive wrist movement on canceler. Lack of vorking space in reac of the chopper affects ability to adopt safe posture. Items need to be reachable (which will ultimately require some twisting/bending) and empty concluses stored securely, without affecting the ability to move around. 		
	Fatigue	Accident Asset damage Personal injury Environmental damage	M (C3)	 Take a break minimum every 3 hours, and a 3 hour break after 6 hours (if two shifts, one of each task, performed in a row). Break more often if required, to be communicated with pilot during shift. If disembarking the helicopter during a shift or between shifts refer to risk associated with disembarking - rotors on and off. Move away from the helicopter to stretch, eat, toilet, rest, etc. Maintain communications with pilot and co- workerty/supervisors PPE for excessive windy/cold conditions Note: shifts relate to DEW staff. Pilot to follow CASA guidelines for fatigue management. 	1.(E)	Operator Pilot Project Manager
Change dispensers	Loose itemis	Asset damage Crash	H (C4)	 Secure old canister ussally on floor of opposite side Maintain communications with pilot 	M (E4)	Operator

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Job Safety Analysis Worksheet

	Manual Handling - Reaching - Bending - Push/Pull	Strains and sprains	M (C3)	 Store extra dispensing canisters within easy reach Communicate with pilot is order to take your time in bending slowly to reach canister and reposition yourself Communicate with pilot when ready to recommence treatment 	L (E3)	Operator
Navigation Data logging Tracking/mapping	Loose items	Asset damage Crash	ins and M (C3) 1. Store extra dispensing canisters within easy reach L (E3) ins 2. Communicate with pilot in order to take your time in bending slowly to reach canister and reposition yourself L (E3) ins H (C4) 1. Ensure items operational and connected prior to take off M (E3) ins H (C4) 1. Ensure items operational awareness M (E3) target M (C3) 1. Maintain situational awareness L (E3) target M (C3) 1. Maintain situational awareness L (E3) target M (C3) 1. Take a break minimum every 3 hours, and a 3 hour break after 6 hours (if two shifts, one of each task, performed in a row). Break more often if required, to be communicate with pilot during shift or between whiths refer to risk associated with disembarking – rotors on add off. 2. If disembarking the helicopter during a shift or between whiths refer to risk associated with disembarking – rotors on add off. 3. Move away from the helicopter to stretch, eat, toilet, rest, est. abs H (C4) 1. Pilot to assess landing site that is free of loose debris and is flat, open terrain. M (E	M (E4)	Operator	
Navigation Data logging Tracking/mapping	Incorrect area treated	Oll-target damage	M (C3)	Maintain situational awareness Familiarise with maps prior to operations Pre-flight briefing on methods and target areas Communicate with pilot	L (63)	Operator
	Fatigue	Accident Asset damage Personal injury Environmental damage	M (C3)	 Take a break minimum every 3 hours, and a 3 hour break after 6 hours (if two shifts, one of each task, performed in a row). Break more often if required, to be communicated with pilot during shift. If disembarking the helicopter during a shift or between whifts refer to risk associated with disembarking – rotors on and off. Move away from the helicopter to stretch, eat, toilet, rest, etc. Maintain communications with pilot and co- workers/supervisors PPE for excessive windy/cold conditions Note: shifts relate to DEW staff. Pilot to follow CASA guidelines for fatigue management. 	4. (E3)	Operator Pilot Project Manager
Landing	Pilot error	Crash Injury	H (C4)	 Pilot to assess landing site that is free of loose debris and is flat, open terrain. Maintain silence whilst landing so as not to distract pilot. Take instructions from pilot. 	M (E4)	Pilot Operator
Disembark - rotors on/off	Fuel	Death	£ (C5)	 Induction, pre-flight briefing Operator and pilot to maintain awareness 	M (E5)	Pilot Operator

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4)	Department for Environment	

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Job Safety Analysis Worksheet

	Loose objects in cockpit Moving Rotors Remote Location	Delayed response Slips, trips falls		 and communication re: hazards Follow pilot's instructions re: moving away in a forward direction and downslope if possible PPE, First Aid kit and training. Maintain situational awareness Immediately move away from helicopter prior to stretching, resting, eating, removing harness, etc. 		
Refuelling (hot or cold)	. Fire :	Burns	M (3D)	 Disembark helicopter and move away from helicopter during refuelling is possible. Access to fire estinguisher Access to first aid kit with burns dressings Trained contractor ground crew and/or pilot to administer fuel 	L (BE)	Pilot Operator Ground Crew
Unioad equipment	Manual handling - Lifting - Reaching - Bending - Push/Pull - Repetitive movement	Personal injury – strainu/sprains Slips, Trips, Falts	M (CE)	 Appropriate manual handling techniques as outlined in Manual Handling braining (Administrative) Team lifting (Administrative) Provide clear access between storage location and whicle Store equipment at appropriate heights Onsite assessment of risk and planning of approach 	L (E3)	Operator

(Q) 🗄

Name:

Manager Endorsement: Name

Government of South Australia Department for Environment and Water

Signature

Signature:



Date

Date

Refer to the following DEW Policies/Procedures for further guidance 1. Safe Driving Procedure DEW 58/0486 2. Manual Hendling SWP 3. Slips Trips & Falls SWP-057 4. Job Safety Analysis Procedure 5. DEH Personal Protective Equipment SWP 6. DEH Hazardous Substances Policy 7. Ergonomics / manual handling 8. Volunteer Safety Framework	Required Training: 1. First Aid Training 2. Manual Handling 3. Step-Back 4. 4WD Operation 5. Task/Activity Specific Training Required Inductions: 1. Working around helicopters 2. Aerial werd control methods	Required Personal Protective Clothing/Equipment (PPE): 1. Gloves 2. Eye protection (safety glasses, sun glasses) 3. Non-slip closed footwear 4. Long slerves 5. Long trousers 6. SPF 30- Sun screen 7. Broad brimmed hat 8. Wet Weather Gear (e.g. Spray Jacket / Waterproof Jacket for cold weather) 9. Task/Activity Specific PPE (e.g. noise protection)	
Assessment Team V00.001: NY WHS&W Committee Max Ba Beinke, Trevor Naismith Assessment Team V00.002- Paul O'lea	Bits/Procedures for further guidance Required Training: Required Personal Protective Clothing/Equipment (PPE): 1. First Aid Training: 1. First Aid Training: 1. Gloves 2. Manual Handling 3. Step-flack 3. Non-slip closed footwear 4. 4WD Operation 5. Long strouwers 5. Long strouwers 5. Long strouwers 6. SPF 30+ Sun screen 7. Broad brimmed hat 8 1. Working around helicopters 8. Wet Weather Gear (e.g. Spray Jacket / Waterproof Jacket for cold weather) 9 2. Aerial weed control methods 9. Task/Activity Specific Training NY WHS&W Committee Max Barr, Darrin Bennett, Russell Martin, Michelle Simes, Grant Roberts, Jeannine Naughton, Jacob sament Team V00.002- Paul O'leary, Denni Russel, Alison, Nicolson, Troy Bowman (PIRSA), Stella Kondylas, Danny Doyle Signature: Date		
Name:	≤ignature:	Date	
Name	Signature:	Date:	

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Government of South Australia Department for Environment Work Health & Safety Job Safety Analysis Worksheet



The risk matrix shall be used in conjunction with the ratings of consequences and likelihood to determine the level of risk rating.

The matrix provides a graphical representation of the risk levels in an absolute or controlled environment. The Department's matrix differs slightly to that in the ISO 31000: 2009 standard as it is designed to look at the risk levels within the Department and the standard is only a guideline.

DEW Risk Matrix

Likelihood of Cansequences		Mashma	m Reasonable Severity of Consequences				
	(3) Insignificant	(2) Minor	(3) Moderate	(4) Major	(5) Severe		
(A) Almost certain	Gree	Median	High	and the second s			
(8) Likely	Saw.	Medium	High	Hab			
IC) Possible	Low	Medum	Medum	16gh			
(D) Unlikely	-	Line	Median	Medium	не		
(E) Rare	Line	Line	Line	Medium	Median		

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Government of South Australia

Work Health & Safety



Job Safety Analysis Worksheet

DEW Risk Authority Table

Risk Level	Action/Response	Risk Owner	Reporting Required	Minimum Review Frequency
Estreme	Invitediate action required. Treatment Plan(s) to be created and managed. Risk to be escalated to the relevant Executive Manager. <u>Risk Owner</u> to notify the Risk & Audit Team.	Relevant Executive	 Report immediately to relevant Executive Report to the Risk and Audit Team who will review and inform the DEWNR Risk Management and Audit Committee. 	3 months
High	Treatment Plan(s) to be created and managed. Risk to be escalated to the relevant Executive Manager. <u>Risk Owner</u> to notify the Risk & Compliance Team.	Relevant Executive	 Report to the relevant Executive Report to the Risk and Audit Team who will review and inform the DEWNR Risk Management and Audit Committee. 	6 months
Medium	Specific monitoring or procedures required, management responsibility shall be specified. <u>Risk to be escalated to Manager</u> responsible for process.	Relevant Manager	 No Reports. Risk to be reviewed by the Risk Owner on an annual basis. 	Annual basis
Law	Manage through routine policy and procedures.	Relevant Manager	 No Reports. Risk to be reviewed by the Risk Owner on an annual basis 	Annual basis

To be approved by DEWNR Risk Management and Audit Committee (RMAC

DEWNR Risk Authority table 130711_2

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Appendix 4: Environmental Risk Assessment



Aerial Boxthorn Control-Environmental





Risk Assessment Team Leader: Paul O'Leary

Date Completed: 27/06/2019

Risk Assessment Team Members: Troy Bowman, Denni Russell and Alison Nicolson

Section		Risk W	/ithout C	ontrols	Controls			Risk	With Co	ntrols
8 2	Description of Hazard	Likely	Cons	Rating	Description of Proposed or Existing Control	(E)xisting or [P)roposed	Type (1-5)	Likely	Cons	Rating
	Off-target damage to vegetation	(C)	(4)	(H)	Apply uniformly throughout the root zone no further than 30cm beyond the drip line. DO NOT apply REGAIN 200 on field crops, near desirable trees or shrubs or to areas into which their roots may extend. DO NOT apply REGAIN 200 in locations where the chemical may be washed into contact with roots of desirable trees or shrubs. Under no circumstances will REGAIN 200 be applied in close proximity to long lived vegetation. The root zone of the off-target vegetation can be estimated in the field as expanding out from the truck at twice the height of the tree. Long lived species includes any eucalyptus species. On moderately sloping ground applicator judgement will be made regarding suitable infestations for treatment based on the number of plants (i.e. quantity of herbicide to	(Ē)	(5)	(E)	(3)	(L)

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Aerial Boxthorn Control-Environmental **Risk Assessment Summary**

Water contamination	(C)	(4)	(H)	be applied) and therefore the associated risk of off target impacts in the event of significant rainfall. DO NOT apply this product within 100 metres of a watercourse. DO NOT apply REGAIN 200 to land to be out	(E)	(5)	(E)	(3)	(L)
Future crop damage	(D)	(3)	3(M);	under field crops within 5 years of application.	(E)	(5)	(E)	(3)	(L)
Chemical movement	(C)	(3)	(M)	DO NOT apply this product to salt or erosion prone areas. DO NOT apply REGAIN 200 on land with a slope greater than 20 percent (11 degrees). Individual site visits are to be conducted pre- trial to determine suitability of site in relation to slope (11 degrees or less), watercourses and off-target species. Maps will be produced marking unsuitable zones and REGAIN 200 will not be applied in these zones. Applicator judgment is to be used when applying herbicide on sloping ground (11 degrees or less) if native plant species are present. In some instances, minimal off-target damage to short flived native species (ic. Tee- tree, nitre bush) may be acceptable and is likely to be reduced by aerial application as opposed to other forms of control. DO NOT apply REGAIN 200 under conditions, which will cause pellet movement to non- target areas during application.	(£)	(5)	(E)	(3)	(L)

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Government of South A Department for Environmen and Water	ustralia M	A	erial Bo Rè	oxthorn Control-Environmental				1	Ņ
	5 S			DO NOT apply REGAIN 200 if an extreme rainfall event is predicted in the near future to avoid herbicide movement. REGAIN 200 will be applied manually by a trained professional in a way which will eliminate wind movement of herbicide. Downdraft from the rotors assists vertical drop of the herbicide which will be hand delivered by hovening directly above each plant. Treatment will not be undertaken during excessively windy conditions due to the OHS&W risk of flying in these conditions.		λ5 č	0		
Loss of habitat for wildlife	(C)	(3)	(M)	Where areas of African Boxthorn are perceived to be the only vegetation providing protection and utilised by wildlife (with no native habitat in close proximity), at least 20 percent needs to be retained. Following herbicide application, boxthorn biomass will continue to provide habitat suitable for nesting/perching and harbour from predators. Careful consideration must be given to control of boxthorn amongst shelter belts (irrespective of vegetation type). These areas are important for the movement of native	(E)	(5)	(E)	(3)	ω

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Government of South Australia Aerial Boxthorn Control-Environmental (4) Department for Environment and Water **Risk Assessment Summary** species and should traverse variable terrain, and link other vegetated corridors where possible. Impacts on the function of shelter belts are to be avoided at all times. 1 1 1 1

Supervisor:

H&S Rep:

Manager Acceptance:

Position:

1 1

DEW Risk Matrix

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