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Dear David,

RE – Parkes Solar Farm 16-473- Noxious Weed Survey

The purpose of this letter is to provide a report on the noxious weed survey conducted at the site of the Parkes Solar Farm Project. In response to the Conditions of Consent provided for the Parkes Solar Farm, a noxious weeds survey is required to enable effective weed management, in accordance with the conditions. Under section 14, Land management, part C requires the applicant to keep the ground cover free of weeds, following any construction or upgrading of the site.

Methods

A noxious weed survey was undertaken by two environmental consultants on the 2nd of February 2017. The site was surveyed by car and by foot traversing the site and recording the location and extent of noxious weeds (as listed on the NSW Noxious Weeds Act 1993) using a GPS. For the purpose of the report, any weeds not listed as noxious that were considered an impedance to the operation of the solar farm were recorded as a high priority weed.

A summary of the condition of the site, including noxious weeds present is provided below. A Map documenting the extent of weeds and recommendations for the management of the weeds is provided as an appendix to this report.

Condition of the Site

The project area for the Parkes Solar Farm is a livestock property comprised of improved pastures which have been sown with a mixture of wimmera rye grass, clover and lucerne. The site has a high percentage of weed cover, generally greater than 50 %, throughout the property. A list of the weeds identified can be seen as an appendix to this document.

There were 7 paddocks which were assessed individually during the survey, each of the paddocks varied in percentage ground cover based on cattle stocking levels (Figure 1). The three most western paddocks have 100% vegetative cover with a large amount of biomass. Along the boundary of these paddocks, evidence of Eucalypt regeneration is occurring between the roadside vegetation and the powerline located 50 meters from the boundary. The design of the solar farm has avoided this area and will not be considered an impedance.

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Figure 1 Existing ground cover in the western paddocks of the site.

The central paddock to the property including the bore has less ground cover percentage as a result of higher traffic or grazing pressure (Figure 2). The remaining paddocks also have considerably less ground cover due to variations in land management and bare ground is visible in many of these paddocks.

Figure 2 Examples of ground cover in the remaining central and eastern paddocks.

High Priority Weeds

Noxious weeds

Three weeds identified in the project area are listed as noxious in the Parkes Shire Council and Include;

- Silver-leaf Nightshade (*Solanum Elaeagnifolium*)
- Lippia (*Phyla canescens*)
- Bathurst Burr (*Xanthium spinosum*)

There are numerous isolated patches of Silver-leaf Nightshade (*Solanum Elaeagnifolium*) throughout the property (Figure 3). This weed is declared as a class 4 noxious weed for the Parkes Shire Council and is also listed as a Weed of National Significance under the National Weeds Strategy (Summary Table).

Figure 3 Patch of Silver-leaf Nightshade looking towards the west

Lippia (*Phyla canescens*) (Figure 4) was identified in a few patches around the main entrance to the property and a larger patch surrounding the drainage areas of the dam in the most northern paddock (see attached weed map). This weed is also declared as a Class 4 noxious weed for the Parkes Shire Council.

Figure 4 Lippia coverage

Bathurst Burr (*Xanthium spinosum*) was identified in four patches on the property, one was located under a paddock tree in the far south-western paddock and the other patches were in the heavily disturbed central paddock close to the dam and bore (see attached weed map). Bathurst Burr is declared as a Class 4 Noxious weed for the Parkes Shire Council.

Under the *Noxious Weeds Act* landholders are required by law to control noxious weeds on their property. The noxious weeds identified for Parkes are all listed as class 4 noxious weeds (Locally Controlled Weed). Class 4 noxious weeds are plants that pose a threat to primary production, the environment or human health, are widely distributed in an area to which the order applies and are likely to spread in the area or to another area.

The requirement for class 4 noxious weeds is as follows;

> Class 4- Locally Controlled Weed.
>
> *The growth of the plant must be managed in a manner that*
>
> *continuously inhibits the ability of the plant to spread and the*
>
> *plant must not be sold, propagated or knowingly distributed.*

Two additional weeds were considered a high priority based on their potential to impede the land management of the solar farm and include:

- Saffron Thistle (*Carthamus lanatus*)
- Fierce Thornapple (*Datura ferox)*

Saffron thistle was observed as the most dominant and wide spread weed in the project area (see attached weed map). Saffron thistle is not declared as noxious for the Parkes Shire Council but is considered a serious weed to crops and pastures in NSW. This weed has been identified as a threat to the management of the Parkes Solar Farm due to its unpalatability to stock, increased fire hazard during seed set and its ability to reduce accessibility to the solar arrays. Recommendations for the management of this weed is provided in the summary table as an appendix.

Fierce Thornapple (*Datura ferox*) was identified in the middle paddock in a patch close to the remnant Grey Box trees (see attached map). Fierce Thornapple is not declared in NSW under the *Noxious Weeds Act 1993* but is considered to compete strongly with pastures plants and is toxic to livestock. This species has been considered a high priority weed for management due its very isolated population of about 20 plants and resulting ability to eradicate the weed from the site and reduce the potential for future spread under the solar arrays.

Recommendations

Management of the weeds identified as high priority is recommended prior to construction and during operation of the solar arrays. A summary table is provided as an appendix which details the level of priority, images of the site and suggested methods for control. The following recommendations are made:

1. Noxious and high priority weeds recorded on site should be managed in accordance with the recommended measures in Appendix A. Should mechanical removal be selected, the weeds and associated soil seed bank should be carefully stripped and removed from site.
2. Ongoing weed management strategies for weeds identified in this report should be implemented for the operation of the Parkes Solar Farm, in close association with the local noxious weeds officer and includes ongoing weed monitoring.

It is important to note that the *Biosecurity Act 2015* will repeal the *Noxious Weeds Act 1993,* and is due to commence in 2017. Local control authority's (LCA) will continue to be responsible under the new legislation for ensuring the control of noxious weeds on private land by its owners and occupiers, on land that the LCA itself owns or manages, and on certain roads, rivers, watercourses and inland waters.

Should you have any questions or wish to discuss further, please don't hesitate to call.

Yours sincerely,

Lisa Hamilton

Environmental Consultant

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NGH Environmental

ATTACHMENTS: PARKES SOLAR FARM WEED MAP

- Bathurst Burr (noxious)
- Common Heliotrope
- Common Thornapple
- Dock
- Fleabane
- Khaki Weed
- Lactuca
- Lippia (noxious)
- Pattersons Curse
- Peppercress
- Saffron Thistle
- Silver-leaf Nightshade (noxious)
- Skeleton Weed
- St. Barnabys Thistle
- Twiggy Mullein
- Wild Oats
- Lippia
- Saffron & St. Barnabys Thistle
- Saffron Thistle
- St. Barnabys Thistle
- Site boundary

0 0.25 0.5 1 Kilometres

J MURPHY 2017

ATTACHMENTS: SUMMARY AND RECOMMENDATION TABLE

Identified weed	Scientific name	Site photo	Legal status	Priority for management	Recommendations	Herbicide options
Bathurst Burr	*Xanthium spinosum*		Class 4 noxious weed	high	**Chipping**-Chipping or hand hoeing is economical for small areas, individual plants or isolated populations. Due to the isolated populations of Bathurst Burr in the Parkes property, hand removal is recommended, however, after controlling burr plants it is important to monitor these sites for further germination events. Ongoing control of this weed will be required over the life of the solar farm.	**Fluroxypyr 200 g/L** (Starane™) Rate: 75 mL per 100 L of water Comments: Apply to actively growing plants. Withholding period: 7 days. Herbicide group: I, Disruptors of plant cell growth (synthetic auxins) Resistance risk: Moderate . **2,4-D amine 625 g/L** (Amicide® 625) Rate: 80–110 mL per 150 L water Comments: Spot spray. Seedlings only, actively growing. Withholding period: 7 days. Herbicide group: I, Disruptors of plant cell growth (synthetic auxins) Resistance risk: Moderate
clover sp.	*trifolium sp.*	sown pasture species		nil	no initial management required	
common heliotrope	*Heliotropium europaeum*			low	no initial management required	
common peppercress	*Lepidium africanum*			low	no initial management required	
Dock sp.	*Ruminex sp.*			low	no initial management required	

Identified weed	Scientific name	Site photo	Legal status	Priority for management	Recommendations	Herbicide options
Feirce thornapple	*Datura ferox*			high	**mechanical removal**-Small infestations should be removed by hand with protective equipment (glove and eye wear) worn before seed set. Bag all material before disposing. This weed will need to be monitored during the life of the solar farm. Remove as soon as identified by chipping out or using the cut and paint method. Ensure that personal protective equipment is always worn when handling this plant.	If infestations become larger- Cut and paint plants with herbicide ensuring that protective equipment (gloves and eye wear) is worn. Bag all material before disposing.
Fleabane	*Conyza bonariensis*			low	no initial management required	
Khaki Weed	*Alternanthera pungens*			low	no initial management required	
Prickly lettuce	*Lactuca serriola*			low	no initial management required	

Identified weed	Scientific name	Site photo	Legal status	Priority for management	Recommendations	Herbicide options
Lippia	*Phyla canescens*		Class 4 noxious weed	high	**Leave area exempt from soil disturbance-** It is recommended to not cause any soil disturbance in areas with Lippia infestation. **Chemical application**-Spot spraying is suitable for treating small infestations. Herbicides should only be applied when lippia is flowering profusely. Generally the first application of herbicide will kill a high percentage of lippia plants. However, the small number of plants that survive need to be controlled or they will rapidly re-invade the following season.	**Dichlorprop 600 g/L** (Lantana 600®) Rate: 5 mL per 1 L of water Comments: Knapsack rate. Completely wet plants. Withholding period: Nil. Herbicide group: I, Disruptors of plant cell growth (synthetic auxins) Resistance risk: Moderate . **PERMIT 14197 Expires 31/07/2018** **2,4-D amine 625 g/L** (Amicide® 625) Rate: 1.7–3.1 L/ha plus 1% crop oil Comments: Pastoral land situation. Apply when Lippia is in a fresh condition, mid-flower, with good soil moisture present. Withholding period: 7 days. Herbicide group: I, Disruptors of plant cell growth (synthetic auxins) Resistance risk: Moderate
lucerne	*Medicago sativa*			nil	no initial management required	
Mallow sp.	*Malva sp.*			low	no initial management required	
Paddy mellon	*Cucumis myriocarpus*			low	no initial management required	
Pattersons curse	*Echium plantagineum*			low	no initial management required	
Prickly saltwort	*Salsola australis*			low	no initial management required	
Wild sage	*salvia verbenaca*			low	no initial management required	

Identified weed	Scientific name	Site photo	Legal status	Priority for management	Recommendations	Herbicide options
Saffron Thistle	*Carthamus lanatus*			High	**Slashing/chemical application**- The optimum time for slashing or cutting usually occurs around October to November followed by spraying of rosettes. .	**MCPA 500 g/L** (Various products) Rate: 100–200 mL in 150 L water Comments: Spot spray. Withholding period: 7 days. Herbicide group: I, Disruptors of plant cell growth (synthetic auxins) Resistance risk: Moderate . **2,4-D 300 g/L + Picloram 75 g/L** (Tordon® 75-D) Rate: 300 mL/ha Comments: Boom spray application for young rosette or seedling plants. Withholding period: 1-8 weeks (see label). Herbicide group: I, Disruptors of plant cell growth (synthetic auxins) Resistance risk: Moderate

Identified weed	Scientific name	Site photo	Legal status	Priority for management	Recommendations	Herbicide options
Silver-leaf nightshade	*Solanum Elaeagnifolium*		Class 4 noxious weed Weed of National Significance	High	**Chemical application**-Silver-leaf nightshade seedlings are readily controlled by all registered herbicides. Spot spraying small infestations of seedlings is important to prevent new silve-rleaf nightshade colonies from establishing. Good herbicide coverage is essential for effective control. Spraying colonies is most successful when plants are fresh after rainfall. If the plant is stressed or dormant the herbicides will have little or no effect.	**2,4-D 300 g/L + Picloram 75 g/L** (Tordon® 75-D) Rate: 650 mL in 100 L of water Comments: Spot spray. Spray to wet thoroughly. Extend treated areas beyond the last plant for 1 m. Withholding period: 1-8 weeks (see label). Herbicide group: I, Disruptors of plant cell growth (synthetic auxins) Resistance risk: Moderate . **Glyphosate 360 g/L** (Roundup®) Rate: 2.0 L in 100 L of water Comments: Apply at early flowering to berry set stage, spray thoroughly to wet. Use only with good soil moisture conditions. Withholding period: Nil. Herbicide group: M, Inhibitors of EPSP synthase Resistance risk: Moderate
Skeleton weed	*Chondrilla juncea*			low	no initial management required	
St Barnabys Thistle	*Centaurea solstitialis*			medium	In infestations with Saffron Thistle, use the same methods.	
Twiggy mullien	*Verbascum virgatum*			low	no initial management required	
Wild oats	*Avena fatua*			low	no initial management required	
Wimmera rye grass	*Lolium rigidum*			nil	no initial management required	

Identified weed	Scientific name	Site photo	Legal status	Priority for management	Recommendations	Herbicide options
Wire weed	Polygonum aviculare L.			nil	No initial management required	